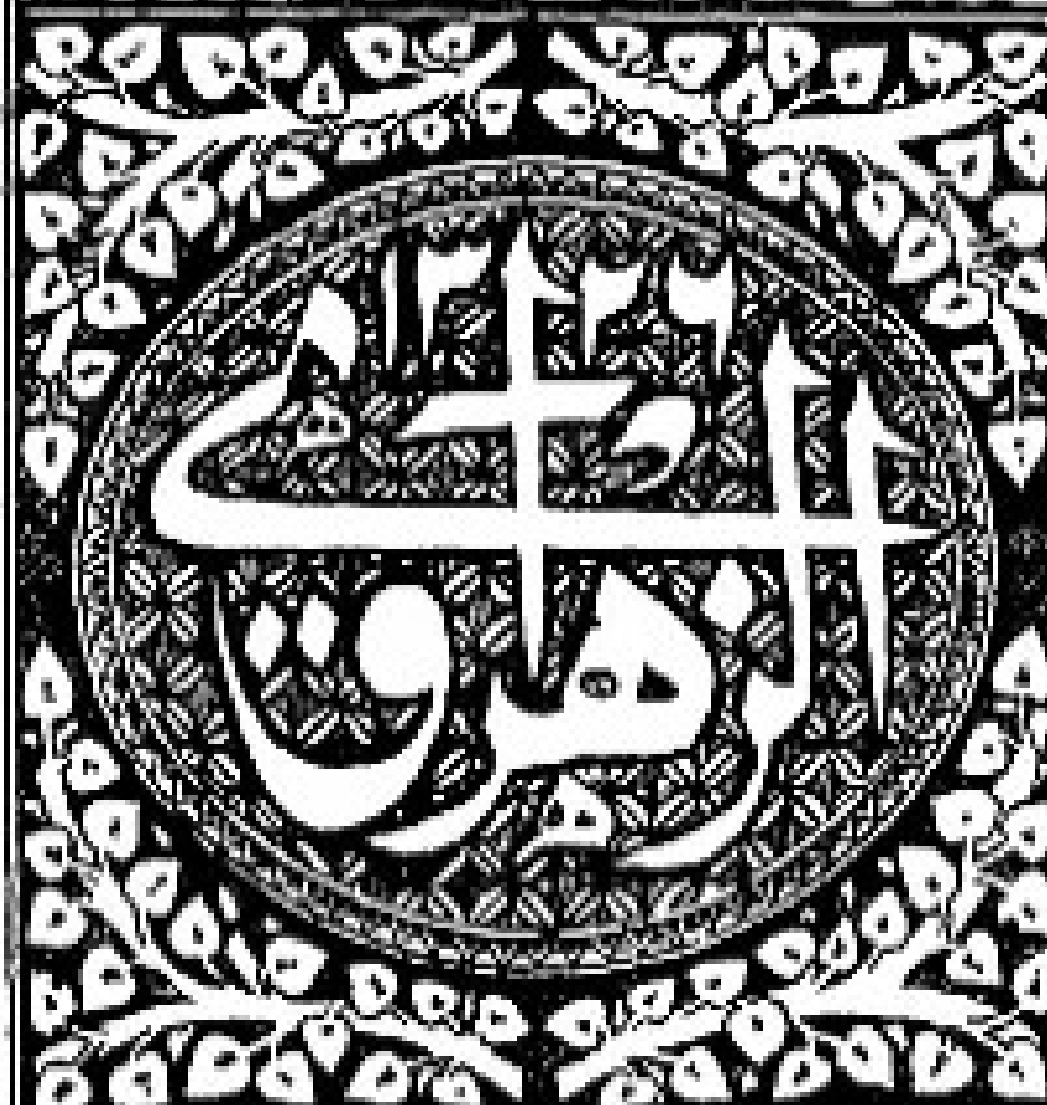


الحمد لله الذي جعل في كتابه
سورة البقرة

التي فيها آيات كثيرة من آيات القرآن



التي فيها آيات كثيرة من آيات القرآن

الحمد لله الذي جعل في كتابه
سورة البقرة

TABLE ONE

ABBREVIATIONS FOR MANUSCRIPTS MENTIONED IN THIS WORK ¹⁾

Ali	= Ali Emiri Arabi Manuscript No. 2854, Istanbul, Turkey.
Asaf.	= Maqalat Asafiyya Library Ms., Hyderabad, Deccan, India.
Bank. 16	= Bankipore Public Library Ms. (No. 16), Khuda Bakhsh O.P. Library, Patna (Bihar), India.
Bank. 17	= Bankipore Public Library Ms. (No. 17), Patna (Bihar), India.
Bes. 502	= Beşir Ağa Ms. No. 502, Istanbul, Turkey.
Bes. 503	= Beşir Ağa Ms. No. 503, Istanbul, Turkey.
Bodl. Or. 491	= Bodleian Or. 491, Bodleian Library, Oxford, England.
Br. Mus.	= The British Museum Ms., Add. 19619, London, England.
Esc.	= Escorial Ms. Arabe No. 876, Escorial, Spain.
Got.	= Gotha Ms. (Arab. 1275; Stz. Kah. 969), Gotha, Germany.
Gran.	= Granada Ms. (no catalog number given), Granada, Spain.
Hunt.	= Huntington Ms., No. 156, Bodleian Library, Oxford, England.
Leid. 13	= Leiden Ms. God. or. 13(2), Leiden, Netherlands.
Leid. 2540	= Leiden Ms. God. or. 2540, Leiden, Netherlands.
Len.	= Leningrad Ms., No. D169, Leningrad, USSR.
Madr. 57	= Madrid Ms. Arabe No. Gg. 57, Madrid, Spain.
Madr. 5007	= Madrid Ms., No. 5007, Madrid, Spain.
Madr. 2008	= Madrid Ms. No. 2008-30, Madrid, Spain.
Mar.	= Marsh Ms. No. 54, Bodleian Library, Oxford, England.
Mar. 42	= Marsh Ms. No. 42, Bodleian Library, Oxford, England.
Mrk. 21	= Marrākush Ms. No. 21 at Al-Kalāwī Library, Marrākush, Morocco.
Mrk.	= Marrākush Ms. No. 404, housed at the library of Ibn Yūsuf's College, Marrākush, Morocco.
Par. 2953	= Paris Ms. Arabe No. 2953, Paris, France.
Par. 5772	= Paris Ms. Arabe No. 5772, Paris, France.
Par. 6208	= Paris Ms. No. 6208, Paris, France.
Par. 6461	= Paris Ms. Arabe No. 6461, Paris, France.
Par. 6824	= Paris Ms. No. 6824, Paris, France.
Rab. 635	= Rabāṭ Ms. No. D. 635, at the Public Library, Rabāṭ, Morocco.
Rab. 1427	= Rabāṭ Ms. No. D. 1427, at the Public Library, Rabāṭ, Morocco.
Sch.	= Şehit Ali Paşa No. 2020, Istanbul, Turkey.
Taym.	= Taymūr Ṭibb Ms. No. 137, at the National Library, Cairo, Egypt.
Top.	= Topkapi Sarayindaki Ms. No. 1990, Istanbul, Turkey.
Tub. 782	= Berlin Ms. or. quart. 782, housed at present in Tübingen, Germany.

¹⁾ For the names and addresses of the libraries where these manuscripts are housed, as well as for further information, see the Bibliography (Manuscripts).

PREFACE

The domain of the 'Abbāsid caliphs in the ninth century and the first half of the tenth gave a rich cultural yield. When we compare such an intellectual outburst with its counterpart in Arabic Spain, Cordova seems eclipsed by glittering Baghdād. Nevertheless, the second half of the tenth century marked Spain's golden age under the Umayyads. Peers to the scholars and writers in the East began to emerge on the cultural scene of this progressing state. At this time among the greatest medical figures of the Western caliphate (according to such historians as Leclerc, Baas, Meyerhof, Sarton, and Garrison) stands Abulcasis.

When we probe into the literature, however, the feeling cannot be escaped that everyone knows *of* Abulcasis without knowing much *about* him and his work. The twenty-eighth and thirtieth treatises (the pharmacochemical *Liber Servitoris*; and the surgical treatise) are of course well known and understood. In fact they were so renowned that they gradually obscured the place of the complete *al-Taṣrīf* as one of the very earliest medical encyclopedias written in the Western caliphate and as a work concerned with medical therapy, materia medica and pharmacy at least as much as with either surgery or clinical medicine.

This circumstance, coupled with the relative neglect of the pharmacomedical history of the Western caliphate, turned us toward the task of gaining a new and better view of Abulcasis based upon the earliest available manuscripts of *al-Taṣrīf*, together with other relevant sources, both primary and secondary. The world-wide search for the manuscripts, eventually filmed in twelve countries has brought together a unique collection that not only permits us to clarify or illuminate many points in the present study, but also gives the foundation for a line of investigation that I expect will yield a series of reports.

Here we attempt to show Abulcasis—hereafter referred to as al-Zahrāwī, his Arabic nickname, and not as Abulcasis, the Latinized form of the transliteration, Abū al-Qāsim—within the cultural and social context of his time, try to clarify what is known about

his life, and to reveal the character of *al-Taṣrīf* as a whole and in particular, of the forgotten twenty-fifth treatise on the "adhān". The pharmaceutical viewpoint from which we examine these matters finds partial explanation in the pervasive pharmaceutical interests of al-Zahrāwī himself, and also in the training of both authors of this study as pharmacists before earning Doctor of Philosophy degrees (history of pharmacy and history of science) at the University of Wisconsin.

The basic work in this book before us formed my dissertation in June, 1959 (under the guidance of my collaborator). Thereafter, both of us have re-shaped it considerably for the present publication. As for me, having lived in the Near East until I was twenty-seven, graduating from the only university that teaches medical and pharmaceutical sciences in the Arabic language, the Syrian University (University of Damascus today), I must take responsibility for the translations and for any inaccuracies in them. In transliterating from Arabic I have followed the system adopted by the Library of Congress (Processing Department, Cataloging Service, Bulletin 49, November 1958, pp. 1-10). Significant technical terms and other transliterated words whose meaning may be unclear to many readers have been defined in Appendix 4 (Glossary).

Whatever its flaws or merits, this work could hardly have reached its present stage and form without the constant encouragement and active participation of my collaborator, the patience and assistance of my wife, and the research funds granted us by the Research Committee of the University of Wisconsin, as well as the partial support awarded me by the University of Wisconsin School of Pharmacy, especially from the Horlick Fund, and the generous aid of a subvention (NSF-G 23675) from the National Science Foundation, Washington, D.C.

Both authors wish to express their warm appreciation to Professor Marshall Clagett for reading the final draft of the manuscript and for his invaluable suggestions on various points throughout the text.

We also call particular attention to the generous cooperation we obtained from the libraries of the University of Wisconsin (Madison, Wisconsin) and the Smithsonian Institution (Washington, D.C.). Finally, we recognize with gratitude the essential services of many

libraries and librarians who helped to secure microfilms and untangle bibliographic puzzles, among whom the following at least should be mentioned:

Biblioteca Apostolica Vaticana, Italy; Biblioteca Nacional, Madrid, Spain, Bibliothèque Général, Rabāt, Morocco (Chief Librarian, A. al-Rajrājī); Bibliothèque Nationale, Paris (Director of Manuscripts Department, Marie-Roberte Guignard); Bibliothèque Nationale al-Zāhirīyah, Damascus, Syria (Librarian A. Hāchem); Bodleian Library, Oxford (Mr. N. C. Sainsbury); British Museum, London (Mr. Martin Lings); The Library of Congress, Washington, D.C.; E. J. Brill, Leiden (Librarian R. Ritsema); Egyptian National Library, Cairo; Harvard University, Cambridge, Mass; Institut Vostokovegenia, the Academy of Sciences of the U.S.S.R., Leningrad; Landesbibliothek, Gotha, Germany (Librarian, Dr. Pachnicke); the Rijksuniversiteit Library, Leiden; The L. C. MacKinney-Smith Fund Collection, Chapel Hill, N.C.; McGill University, Medical Library, Montreal; National Library of Medicine, Washington, D.C.; Österreichische Nationalbibliothek, Vienna; Real Biblioteca de San Lorenzo, El-Escorial, Spain; Suleymaniye Ümümi Kütüphanesi, Istanbul; Universitätsbibliothek Tübingen, Tübingen, Germany; and Yale University's Medical Historical Library, New Haven, Connecticut.

SAMI HAMARNEH

CHAPTER ONE

ARABIC CULTURE IN SPAIN TO THE TIME OF AL-ZAHRĀWĪ

CONQUEST AND CONSOLIDATION

Early in the eighth century Mūsā ibn Nuṣayr governed North Africa under the Umayyads of Damascus. Having completed the Islamic conquest of North Africa to the Atlantic, he looked with ambitious eyes across the strait toward the opposite northern shores, to the Iberian Peninsula. After careful consideration, Mūsā took a decisive step. His lieutenant general, Ṭāriq ibn Ziyād, launched the attack in 711 A.D., and together they completed the conquest by 714.

In the ensuing forty-four years and seven months (711-56 A.D.) under the caliphate of Damascus, Spain had no less than twenty governors, an average of less than two years and three months in office for each. Such instability tended to hamper intellectual development of the country. Moreover, the Berbers—who composed the largest part of the victorious army—and Christian Spaniards formed a majority in the population of “al-Andalus” ¹⁾. The Arabs, although the ruling class, remained a minority. Socially and politically, these unharmonized elements continued to threaten the country’s peace and stability ²⁾.

The second dramatic phase of the history of Arabic Spain materialized with the surrender of Cordova, the capital, to ‘Abd al-Rahmān I, a scion of the fallen and still persecuted Umayyad family in Syria. ³⁾

¹⁾ The occupied part of the Iberian Peninsula the Arabs continued to call “Al-Andalus” (الأندلس). For convenience however, we shall refer to it as Arabic Spain.

²⁾ J. B. Trend, “Spain and Portugal,” in Thomas Arnold, and Alfred Guillaume, *The Legacy of Islam* (3rd ed., Oxford, 1952), 5-8.

³⁾ For details on “the weary wanderings of a Prince in disguise,” (‘Abd al-Rahmān I) and his victory, the reader is referred to Henry Coppee, *History of the Conquest of Spain by the Arab-Moors* (vol. 2, Boston, 1881), 78-117, 149-167.

During his reign (756-88 A.D.) 'Abd al-Rahmān I directed his energy toward the consolidation and restitution of the state. At his instigation the great bridge was built over the river "Wādī al-Kabīr" (وادی الكبير)—known by the distorted Arabic name Guadalquivir. During his reign also the mosque of Cordova was erected. But he spared little time to encourage learning or to invite scholars to his court, as his counterpart in Baghdād did.¹⁾ Moreover, hostilities with the Eastern Caliphate continued to hamper cultural intercourse between the two domains.

An encouraging step was taken during the reign of his son (788-96 A.D.), the ruling prince „al-Amīr" Hishām I.²⁾ Hishām perhaps was the first in Arabic Spain to stimulate education, which later rulers fostered still more vigorously. We shall have occasion to refer to some of these Muslim monarchs repeatedly, for at their courts men of learning found homage, prestige and encouragement. They used the state treasury to sponsor education and scholarly investigation, giving impetus to developments in the arts and applied sciences. At their courts, "public schools," and religious centers, and in the various affairs of the state, we find physicians and theologians, mathematicians and astronomers, poets and philologists given good pay and prestige for their services.

In these circles then began a flowering of cultural activities in Arabic Spain. It gained a stronger impetus during the reign of 'Abd al-Rahmān II (822-52). Yet, when these achievements of the first half of the ninth century are compared with the cultural outburst that swept Iraq and the adjacent states under al-Ma'mūn and his immediate successors,³⁾ one realizes how much, thus far,

¹⁾ About this time in Baghdād (765 A.D.) Caliph al-Manṣūr invited the famous physician, Jurjīs ibn Bakhtishū' to be his court physician, and bestowed upon him generous gifts. He did the same for other scholars who flocked to Baghdād and contributed to its cultural development.

²⁾ For a useful, concise chronological table of the Umayyad dynasty in Cordova, the reader is referred to Angel González Palencia, *Historia de la España Musulmana* (Barcelona, 1925), 13, 33.

³⁾ Al-Ma'mūn instigated the establishment of "The House of Wisdom" (بيت الحكمة) in 830 A.D. at Baghdād for translating the writings of the ancients, mainly from Greek into Arabic, as well as for promoting cultural activities. In this center men of high intellectual reputation, such as Ḥunayn ibn Ishāq, his son Ishāq and his nephew Ḥubaysh, 'Isā ibn Yaḥyā, and Yaḥyā ibn Batrīq were active.

Arabic Spain lagged behind. The caliber of scholars and translators from the Greek and other languages serving under the 'Abbāsids was not yet available in Spain.

But before long, trade, travel, immigration, and more progressive government in Spain furthered Arabic culture there. The return of many learned men to Spain after being trained in the East and the importation of a great number of books in the arts and sciences brought unprecedented advances in the land. Without these works and training Spain would have waited much longer to reach the cultural prestige that was shortly to be hers. Moreover, the intellectual revival of Western Europe during the twelfth and thirteenth centuries might have been seriously affected.

CULTURAL DEVELOPMENT IN THE LATE NINTH CENTURY

One of the pioneering scholars of Arabic Spain, the learned Baqī ibn Makhlad, plays an important role during the second half of the ninth century. He had emigrated from Cordova to the Eastern Caliphate in pursuit of knowledge ¹⁾, and after his return to Cordova, theologians there accused him of heresy. The firm stand of the ruling prince, Muḥammad I (reigned 852-86 A.D.), in support of Ibn Makhlad ²⁾ marked a victory for advancing culture.

At this time Yūnis ibn Aḥmad al-Ḥarrānī also returned to his native country, Spain. He had been on a similar trip to the Eastern Caliphate for better training in the health field. The services of this physician at Cordova proved significant for the development of Arabic medical practice. Of further interest, from a pharmaceutical point of view, is the medicated confection [i.e., "ma'jūn" (معجون)] of a secret formula that he devised and used in the treatment of his patients. It was sold in great quantity ³⁾ in much the same way as secret remedies of the past century.

¹⁾ About the middle of the ninth century and thereafter, many learned men went from Spain to the Eastern Caliphate to gain more knowledge and experience. Upon their return, they helped enrich cultural activities in their native land.

²⁾ Ibn 'Idhārī al-Marrākushī, *Al-Bayān al-Mughrib fī Akhbār al-Andalus wa al-Maghrib*, G. S. Collin, and E. Lévi-Provencal, eds. (vol. 2, Leiden, 1951), 109-110.

³⁾ 'Alī ibn Yūsuf al-Qiftī, *Ikhbār al-'Ulamā bi Akhbār al-Ḥukamā* (Cairo, 1326 A.H. [1908 A.D.]), 258-9.

Al-Harrānī's contemporary, Jawād al-Masihi, also introduced a special "branded medicine" that became known as the Monk's Remedy, "Dawā al-Rāhib" (دوا الراهب). He also devised several pharmaceutical compounds that were named after him: Jawād's Lohoch, Syrup, Powder, et cetera.¹⁾ These secret proprietary preparations of al-Harrānī and Jawād seem to be the earliest of the kind known to have been sold in Arabic Spain.

Our study of the available literature pertaining to the health field in ninth-century Spain reveals no mention of independent pharmacy. Whenever pharmaceutical work is required we see the work done by, or under the supervision of, men who were first of all medical practitioners. They prepared medications for their own use in the various pharmaceutical forms.²⁾ There apparently was influence from the Eastern Caliphate, where—in spite of the separation of pharmacy from medicine—even eminent physicians still carried on the tradition of preparing the various medications for their patients. Nevertheless, professional pharmacists in public and hospital pharmacies, who already were flourishing in the East,³⁾ did not yet have a counterpart in the Iberian Peninsula as far as we know from evidence at hand.

SPAIN IN THE TENTH CENTURY

In the year 912, the eighth of the Umayyad monarchs in Spain, 'Abd al-Raḥmān III, came to the throne, bringing more progress

¹⁾ Aḥmad ibn al-Qāsim Ibn Abī Uṣaybi'ah, *Uyūn al-Anbā fī Ṭabaqāt al-Afībbā* (vol. 2, Cairo, 1882), 41.

²⁾ Ibid., 41-2.

³⁾ A mention of public pharmacies was reported during the reign of al-Mahdī in Baghdad (775-85 A.D.). Supposedly the first person to be called a pharmacist, i.e., "al-Ṣaydalānī" (الصيدلاني), was Abū Quraysh 'Isā al-Ṣaydalānī, but he was not an educated practitioner and reportedly lacked pharmaceutical skill (Qiftī, *Akhhbār*, 280-3). In the first half of the ninth century, however, educated and reliable pharmacists called "ṣayādilah" (صيادلة) obtained licenses authorizing them to practice the profession in the large military camp near the capital. This authorization to practice the profession came from the major general of the army with the approval of the caliph. (Uṣaybi'ah, *Uyūn al-Anbā*, 1: 109-113). For a further detail see Sami Hamarneh, "The Rise of Professional Pharmacy in Islam," *Medical History*, 6 (1962), pp. 59-66.

than at any time in the past. By 929 A.D. 'Abd al-Rahmān, as a rival to the incompetent caliph of Baghdād, proclaimed himself the caliph of Islam, the prince of the believers (أمير المؤمنين), and took the title „al-Nāṣir” (النَّاصِر).¹⁾ From that time until the fall of the Umayyads about a century later the rulers of Arabic Spain represent the Western Caliphate and are distinguished from the rulers of the Eastern Caliphate in Baghdād.

Arabic Spain reached the zenith of its glory during the reign of al-Nāṣir (912-61) and his son and successor, al-Ḥakam II al-Mustanṣir (reigned 961-76). Great advances were made in the various avenues of human endeavor: agriculture and horticulture, trade and transportation, army and navy, and construction and industry.²⁾ The expenditure on construction alone equalled the whole budget for defense and was one third of the revenue of the state treasury.³⁾

An extensive program for beautifying the capital was undertaken.⁴⁾ This included bringing in, through aqueducts, potable water to supply a growing city with a population of one-half million and 113,000 houses, besides the palaces, government buildings, public baths, libraries, hotels and schools. The bridge that 'Abd al-Rahmān I built over the great river of Cordova was redesigned and enlarged. At the same time the great Mosque of Cordova ("Mosquée Cathédrale") was added to and magnificently embellished, to become a worthy rival to the holy shrines in Jerusalem and Mecca. Known today as the Cathedral of Cordova, it stands as a monument to the grandeur achieved in the tenth century.⁵⁾ Thus Cordova became the most civilized city in Europe,

¹⁾ Carl Brockelmann, *Geschichte der islamischen Völker und Staaten* (München, 1939), 169-71.

²⁾ For a reliable survey concerning progress in the utilization of mines, metal and non-metal substances, and the major producing centers in the Peninsula, the reader is referred to César E. Dubler, "Über das Wirtschaftsleben auf der iberischen Halbinsel vom XI zum XIII Jahrhundert; Beitrag zu den islamisch-christlichen Beziehungen" in *Romanica Helvetica*, 22 (1943), 12-21, 35-45, 49-66.

³⁾ Marrākushī, *al-Bayān*, 2: 229-32.

⁴⁾ For further details see Muḥammad ibn 'Abd Allāh al-Ḥimyarī, *al-Rawḍ al-Miṣṣār fī Khabar al-Aqṭār*, extracted and edited by E. Lévi-Provençal (Leiden, 1938), 153-8.

⁵⁾ For further details the reader is referred to the interesting and reliable account by E. Lévi-Provençal, *L'Espagne Musulmane au Xème Siècle: Institutions et vie sociale* (Paris, 1932), 195-236.

the wonder and admiration of the world. In the Islamic Empire it ranked second only to Baghdād, and in Christendom next after Constantinople ¹⁾.

Al-Zahrā'.—One of the most remarkable facets of architectural elegance was displayed in the construction of the magnificent royal city of al-Zahrā', located five miles northwest of Cordova. The city included the Caliph's palace, surrounded by beautiful gardens, with special wings for the royal family, the court's affairs, the imperial library, and for noteworthy guests (دار الضيافة). Archeological excavations at the site have revealed the splendors of the city in the tenth century. ²⁾ Al-Nāṣir laid the foundation stone in 936 A.D. in commemoration of Zahrā' (زهراء), his wife, ³⁾ if we accept this romantic story as a historical fact.

Whatever the immediate motive, al-Nāṣir undoubtedly looked with anticipation to a royal city that would match the grandeur of his expanding power and prestige, ⁴⁾ and would be set apart from the crowded teeming city of Cordova. Al-Nāṣir appointed his son, al-Ḥakam II, as supervisor to assure a careful selection of the best materials and expert workmen. ⁵⁾ Whether we call the result, with Dozy, the "Pompeii of the Arabs," or with Hariz the "Versaille of the Umayyads," ⁶⁾ it was a glorious city. It was here in al-Zahrā' that the physician-pharmacist al-Zahrāwī, was born and lived.

TENTH-CENTURY CULTURAL ACTIVITIES

Besides heavy government expenditure on construction and the army, large funds were expended for the arts and sciences. In cities across Spain, education was enjoyed by a segment of the people

¹⁾ R. P. A. Dozy, *Histoire des Musulmans d'Espagne* (vol. 3, Leiden, 1861), 90-4. (This work has been revised and edited by Lévi-Provençal, in Leiden, 1932).

²⁾ Torres L. Balbás, "Crónica arqueologica de la España Musulmana," in *Al-Andalus*, 2 (1934): 336-42.

³⁾ George Sarton, *Introduction to the History of Science* (vol. 1, Baltimore, 1927), 628.

⁴⁾ Muḥammad A. Enān, *Dawlat al-Islām fī al-Andalus, al-Faṣl al-Awwal* (pt. 2, Cairo, 1952), 91-8.

⁵⁾ Marrākushī, *al-Bayān*, 2, 231-2.

⁶⁾ Joseph Hariz, *La Part de la médecine arabe dans l'évolution de la médecine française* (Paris, 1922), 23.

surprisingly broad for that time. Schools for higher learning began to spread in Cordova and other centers.¹⁾ Cultural studies, as we have noted received a strong impetus during the reign of al-Nāṣir (912-61), and continued to grow through the days of his son al-Mustanṣir (961-76), who, beside being a champion of learning, was himself one of the most scholarly monarchs of Islam. The intellectual life in his time resembles that of al-Māmūn's reign, over a century and a quarter earlier, in the East. Interestingly, al-Mustanṣir's educational philanthropy in the West coincided with a display of generous patronage to learning in the Eastern Caliphate under 'Aḍud al-Dawlah the Buwayhid (949-83). "Such abundant activities," Sarton states, "had never occurred before, not even in the best days of Alexandria."²⁾ It created an epoch of rewarding harvest.

Besides opening a number of new "public" schools, al-Mustanṣir himself was a great collector of books. He sent agents to Baghdād, Damascus, Cairo, and other centers in the Islamic world to purchase valuable works in the various fields of knowledge. According to his librarian, Talid al-Khaṣṣī, the Imperial Library became crowded with 400,000 volumes, the listing of which filled forty-four index catalogs of twenty folios each. Many of these works were annotated on the margin in al-Mustanṣir's own handwriting, where he added biographical notes on the authors and other data. In his court he summoned copyists and bookbinders for work in the library.³⁾ Al-Zahrāwī practiced nearby and quite probably availed himself of the intellectual wealth at hand, in preparation for his work.

Here a brief discussion of the general cultural output of the period seems appropriate. This may help us perceive more vividly the milieu in which al-Zahrāwī wrote his *al-Taṣrīf*. Such cultural contributions, in or adjacent to al-Zahrāwī's time, were defined by

¹⁾ Dozy, in *Histoire*, 3: 108-10, speaks of the University of Cordova. We believe that there were private and public schools but no such central academy at this time. See Ṣā'id ibn Aḥmad ibn Ṣā'id, *Ṭabaqāt al-Umam*, Louis Cheikho, ed. (Beirut, 1912), 66.

²⁾ Sarton, *Introduction*, 1: 647-8.

³⁾ Aḥmad Abū al-ʿAbbās ibn Muḥammad al-Maqqarī, *Nafḥ al-Ṭib min Ghuṣn al-Andalus al-Raḥīb*, R. Dozy et al. eds. (vol. 1, Leiden, 1858-61), 249-50, 256-7.

Ibn Ḥazm¹⁾ as embracing one or more of the following seven categories:

1. To invent or discover something for the first time.
2. To complete something theretofore unfinished.
3. To uncover and explain obscurity in the writings of a significant author.
4. To abstract a detailed work without distorting the actual meaning.
5. To gather together scattered information or facts about a certain subject.
6. To harmonize and systematize a confused and irregular work, the material of which is out of order.
7. To correct errors committed by earlier authors.²⁾

These points seem to have been accepted then as a convenient general standard of intellectual achievement; and we shall confine ourselves to them in the following paragraphs.

The Health Field

Spain in the tenth century, especially late in the century, made an appreciable contribution to Arabic developments in the health field. Several distinguished names stand high in accomplishment.

Among medical writers who follow a Greek pattern, Yaḥyā ibn Ishāq is a good example. The son of a physician, he himself was a distinguished physician and statesman in al-Nāṣir's administration. He wrote a medico-encyclopedic work in five books.³⁾ In clinical medicine and pharmaceutical technic, Ibn Mulūkah and Sa'īd ibn 'Abd Rabbih deserve mention. The latter was a scholar, poet and author who wrote a drug compendium or "aqrābādhīn",⁴⁾ the first of its kind known to have been written in Arabic Spain. He wrote almost a century after his predecessor in the Eastern cali-

¹⁾ 'Alī ibn Muḥammad ibn Sa'īd ibn Ḥazm (994-1064 A.D.), from a notable family and the prime minister to Caliph 'Abd al-Raḥmān V. After the fall of the Umayyads he kept clear of politics for the rest of his life. He probably was the greatest scholar and most original thinker of Arabic Spain.

²⁾ Maqqarī, *Nafḥ al-Tīb*, 2: 119-20.

³⁾ J. von Hammer-Purgstall, *Literaturgeschichte der Araber* (vol. 5, Vienna, 1854), 344.

⁴⁾ Uṣaybi'ah, *Uyūn al-Anbā*, 2: 39-41, 44-5.

phate, Sābūr ibn Sahl (d. 869), whose unofficial formulary became a standard text in public and hospital pharmacies,¹⁾ perhaps the first of its kind in Islam.

Turning to surgery, we find Hārūn ibn Mūsā al-Ashbūnī, who acquired a good surgical reputation, serving at the court of al-Nāṣir and his son al-Ḥakam II; hence, he was contemporary to al-Zahrāwī, whose surgical work became so famous and influential. As far as we know from later biographies, al-Ashbūnī left no surgical treatises, and Ibn Ḥamz did not list him among famous contributors to cultural activities in Arabic Spain.²⁾ Another physician who practiced surgery in the same period was Khālīd ibn Yazīd ibn Rūmān of Cordova, whose contribution was mainly in the field of botanical drugs "al-shajariyah" (الشجرية). Works on this and related topics continued to increase in number and significance in Spain during the three following centuries. It seems evident now, that these Arabic writers on materia medica³⁾, who emphasized drug identification, preparation, and therapy have excelled those of the Greco-Roman period.⁴⁾

Also in the field of botanical medicine was the alphabetically arranged work "On Simples" written by the physician Ḥāmid ibn Samjūn (d. 1001), who relied heavily on classical medical authors. His contemporary was Sulaymān ibn Juljul (fl. 983), a more distinguished medical author, who wrote several valuable medical works that deserve further historical study. His works have been cited

¹⁾ Muḥammad ibn Ishāq ibn al-Nadīm, *al-Fihrist* (Cairo ed., [1930]), 427.

²⁾ According to Maqqarī (*Nafḥ al-Ṭib*, 2: 108-121), Ibn Ḥazm wrote his epistle in reply to the challenging letter from his cousin Abū al-Maghīrah 'Abd al-Wahhāb. The writer of the letter, Ibn al-Rabīb al-Tamīmī of Qayrawān, asks in ridicule why the scholars of Arabic Spain were lagging behind their colleagues in the East in furnishing chronologies and biographies of their great leaders, heroes, and men of letters and science. Ibn Ḥazm, through his reply, has given us one of the most interesting and valuable documents on the cultural development in Arabic Spain up to his time.

³⁾ By materia medica here we generally mean writings which deal with known curative substances, their origin, identification, and classification as natural products from plant, animal and mineral. Then, how they are collected, prepared, and administered in the treatment of diseases and their suggested or observed therapeutic "virtues".

⁴⁾ Max Meyerhof, "Esquisse d'histoire de la pharmacologie de botanique chez les Musulmans d'Espagne," in *Al-Andalus*, 3 (1935): 1-4.

by al-Zahrāwī repeatedly. He admired Dioscorides and wrote a commentary on his *Materia Medica*. Yet, ibn Juljul went further by writing another treatise on drugs that are not mentioned by Dioscorides. His philosophy of medical treatment, which has an Aristotelian teleological tendency, is of interest.

His central idea remained current in the West down to modern times: God created agents for the healing of the human body. These healing agents are distributed in plants and animals that walk or creep above the earth or swim in the deep, and in the various forms of minerals. All these are but emissaries of mercy and help to men. ¹⁾

Ibn Juljul also reported the interesting story of how Dioscorides was translated in Arabic Spain. ²⁾ From his account one could infer that the immediate impulse behind such an undertaking probably was the gift to al-Nāṣir, from the Byzantine Emperor Constantine VII in 948, containing a beautifully illustrated copy of Dioscorides. In 951 the same emperor sent to Cordova a learned monk, Nicola, to help translate this Greek manuscript into Arabic. ³⁾ With him in this great project, a number of physicians participated. They desired to correct any errors in earlier translations and to identify the individual drugs. Among these distinguished physicians was the famous Jewish theologian and statesman, Ḥasdāy ben Shaprūt (915-70); Muḥammad the botanist; and Abū 'Abd Allāh the Sicilian, who knew Greek well and had the ability to identify the simples. ⁴⁾ They supposedly made an improved Arabic version of Dioscorides, and it has been perhaps the most significant single work contributing to the development of materia medica in the Western caliphate. Al-Zahrāwī himself referred repeatedly to the work of Dioscorides, and we are inclined to believe that he made good use of this outstanding though incomplete version.

Philosophy and Theology

Orthodox theologians of Arabic Spain usually were bitter opponents

¹⁾ Uṣaybi'ah *Uyūn al-Anbā*, 2, 46-8.

²⁾ *Ibid.*

³⁾ In the Eastern caliphate, a century earlier, Iṣṭifān Ibn Basīl, brought out an incomplete translation of the work of Dioscorides. It was corrected by Hunayn ibn Ishāq.

⁴⁾ See Max Meyerhof, "Die Materia medica des Dioskurides bei den Arabern," in *Quellen und Studien zur Geschichte der Naturwissenschaften und der Medizin*, 3 (1933), 72-84.

of philosophical studies and free thinking. Many philosophers were looked upon by fanatics as transmitters of heathen ideas.¹⁾ They were persecuted and their works burned publicly. This took place in particular when Muḥammad ibn Abī 'Āmir (d. 1002) became a royal chamberlain (Hājib) and Vizir under Hishām II (976-1009) and served as the virtual ruler of the state.²⁾ In Arabic Spain, nevertheless, many authors kept on writing secretly, and many of the people are said to have continued to read and enjoy their philosophical works.³⁾ These activities became vigorous in the late eleventh century, culminating in significant contributions of the twelfth century, such as the renowned works of ibn Rushd (Averroes).

Astronomy and Mathematics

Many physicians who practiced the profession contributed also to mathematical and astronomical studies. For example, the physician 'Abd al-Malik al-Thaqafī, who flourished in the second half of the tenth century, became an expert in land survey.⁴⁾ His contemporary, Maslamah al-Majrīṭī (d. 1008) of Cordova, studied Euclid and Ptolemy carefully and wrote several works in astronomy and mathematics, the best thus far in Spain. He also revised the astronomical and trigonometrical tables of the immensely influential Eastern mathematician, al-Khwārizmī (780-c. 850 A.D.)⁵⁾ of whom he was a worthy successor. Al-Majrīṭī was also a great teacher whose personality and intellectual abilities attracted students to his lectures from all over the country; and more than a few became distinguished scholars later on. Ibn al-Samḥ, for example, wrote an introduction to geometry and a treatise on the astrolabe. Another student of al-Majrīṭī was Abū al-Ḥasan 'Alī ibn Sulaymān al-Zahrāwī (not to be mistaken for his contemporary, the central figure of the present study, Abū al-Qāsim Khalaf

¹⁾ Miguel Asín Palacios, "Tesis de la necesidad de la revelación," in *al-Andalus*, 3 (1935), 380-3.

²⁾ 'Alī ibn Muḥammad Ibn Ḥazm, *The Ring of the Dove*, A. J. Arberry, ed. and tr. (London, 1953), 9; and Philip K. Hitti, *History of the Arabs* (6th ed., London, 1958), 531-533.

³⁾ Al-Maqqarī, *Nafḥ al-Ṭib*, 2: 119, 125.

⁴⁾ Uṣaybi'ah, *Uyūn al-Anbā*, 2: 46.

⁵⁾ Sarton, *Introduction*, 1: 563, and Heinrich Suter, *Die Mathematiker und Astronomen der Araber und Ihre Werke* (Leipzig, 1900), 76-77, #176.

al-Zahrāwī). Abū al-Ḥasan, although a physician, made his main contributions in mathematics and astronomy.¹⁾

About 967, Gerbert of Aurillac, who later became Pope Sylvester II (999-1002), travelled in Spain and was exposed to these advances in science and philosophy.²⁾ Presumably this encouraged him to introduce such intellectual studies on his return to the West.

Poetry, Philology and Historiography

Poetry, philology and historiography were favorite topics of learned men in Arabic Spain. Poetry, for example, was enjoyed by caliphs, scholars, theologians and others, who were taken by its rhythmical attractiveness. In Spain, new forms of poetry such as

"al-Muwashshahāt" (الموشحات) and "al-Zajal" (الزجل) developed by this time. It is possible that these literary contributions influenced similar developments in French and Spanish vernaculars later on.

Arabic philology, surprisingly enough, advanced greatly in the country in spite of its geographical location far from the center of Arabism. Learned men of Arabic descent, or Spanish Christian and Jewish background excelled in these studies. A large proportion of the population was bilingual, but classical Arabic was the official language and the medium of scholarly contributions, although dialects naturally arose.³⁾

Historiography developed more rapidly and on a sounder base during the reign of al-Mustansir (961-76). The caliph himself encouraged this development, which matured in the centuries immediately following.

In recalling briefly the development of cultural activities in Arabic Spain prior to and during the lifetime of al-Zahrāwī, we are better prepared to study the man and to evaluate his work.

¹⁾ *Ibid.*, 82-83, #190.

²⁾ Carra de Vaux, 'Astronomy and Mathematics,' *Legacy of Islam*, 386.

³⁾ Trend, in his article "Spain and Portugal," *Legacy of Islam*, 5-8, went a little too far in exaggerating these differences of languages and races in the land.

CHAPTER TWO

A GREAT PHYSICIAN IN THE WESTERN CALIPHATE

ADMIRATION VS. INFORMATION

Al-Zahrāwī, the renowned physician of Arabic Spain during its golden age, figured prominently in the development of the health field, not only in his own country but in the West also.¹⁾ When Ibn Ḥazm (994-1064 A.D.) wrote his epistle on eminent scholars of Arabic Spain, al-Zahrāwī was one of four significant figures mentioned in the health field.²⁾

In the first half of the thirteenth century, Ibn Saʿīd, the historian, supplemented the biographical list of Ibn Ḥazm,³⁾ and here we find al-Zahrāwī listed among the best five in the health field—a high reputation that rested mainly upon the value of his book, *al-Taṣrīf*. By now apparently this work had acquired fame not only in Spain, but in North Africa (including Egypt) and the Eastern Caliphate as well.⁴⁾

Despite al-Zahrāwī's prestige—greater even in the West than in the Arabic world—the available information concerning his life and personality is fragmentary. Speculative details about the man spawned contradictions in the literature. This resulted in controversy that confused more than it clarified.⁵⁾

Al-Zahrāwī's available biography appears especially scanty when compared with other Arabic physicians of the same caliber.

¹⁾ Guillermo Folch Jou, *Historia de la farmacia* (Madrid, 1951), 104.

²⁾ Aḥmad ibn Muḥammad al-Maqqarī, *Nafḥ al-Ṭīb min Ghusn al-Andalus al-Raṭīb*, R. Dozy et al., eds. (vol. 2, Leiden, 1858-61), 119.

³⁾ An interesting fact concerning Arabic historiography in Spain is that often a later historian completes the work that a predecessor started. A similar example is the biographical work written by Ibn al-Farādī (962-1013 A.D.)—who was born, lived, studied, taught and died in Cordova—which was supplemented in 1139 A.D. by Ibn Bashkuwāl (1101-1183). This supplement was in turn continued by Ibn al-Abbār, a historian of Valencia (1199-1260 A.D.), who brought it up to his time.

⁴⁾ al-Maqqarī, *Nafḥ al-Ṭīb*, 2, 121-5.

⁵⁾ Lucien Leclerc, *Histoire de la médecine arabe* (vol. 1, Paris, 1876), 437-9.

In Spain, for example, we know more about Ibn Juljul (fl. 982), Ibn al-Wāfid (997-1074)¹), and Ibn Rushd (Averroes, 1126-98) than we know about him. In the Eastern Caliphate, biographical information of eminent physicians, such as Ibn Māsawayh (Mesue the Elder, d. 857), al-Rāzī (Rhazes, c. 865-c. 925 A.D.) or especially Ibn Sīnā (Avicenna, 980-1037) is more satisfactory and comprehensive.

The result of comparing and evaluating all the obtainable data on al-Zahrāwī reveals a somewhat clearer picture than we have had heretofore. As we try to glimpse al-Zahrāwī through the veil of history half perceived, the background setting of his time may be recalled from the previous chapter.

BIRTH AND EDUCATION

The nickname "al-Zahrāwī" (الزهرأوى), which is attached to the man's real name, Abū al-Qāsim Khalaf ibn 'Abbās, (أبو القاسم خلف بن عباس) suggests unmistakably that his birthplace was the royal city "al-Zahrā'." Giving a man his nickname or "Nisbah" after the town in which he was born was routine in the Arabic world, and still is.²) If this is accepted, then al-Zāhrāwī must have been born in or after 936 A.D., since we know that the construction of al-Zahrā' was started by Caliph al-Nāṣir only in that same year.

What about al-Zahrāwī's parentage? Historical records are silent. From our knowledge of the circumstances, it appears that a large percentage of the residents of al-Zahrā' were in some way connected with either the caliph, the court and the state service, or the construction of the palace, al-Zahrā', and the city around it.

Al-Zahrāwī's parents stood within a social hierarchy. At the top would be the royal family, the cabinet, the administrators and high government officials; while at the bottom, for example, stood servants, concubines, and construction laborers.

The wording of al-Zahrāwī's full name suggests that his father

¹) Abū al-Muṭarrif 'Abd al-Raḥmān ibn Wāfid al-Lakhmī (998-1074) was a great physician and statesman of Toledo. He wrote several books pertaining to medicine and pharmacy.

²) For confirmation of the accuracy of this "Nisbah," see Louis M'alūf, *al-Munjid fī al-Lughah wa al-Ādāb wa al-'ulūm* (15th ed. rev., Beirut, 1956), (و) (Preface).

was called 'Abbās, a popular Arabic name since pre-Islamic times. One may speculate that if the father enjoyed a high social rank it probably would have been mentioned. With such men it was customary to pronounce the nobility of their ancestry.¹⁾

Manuscripts of *al-Taṣrīf* (Tub. 782, Bes. 502, Seh., and Par. 5772) shed new light on the origin of al-Zahrāwī's family heretofore not mentioned in the literature. The incipit to the seventeenth treatise in these manuscripts gives al-Zahrāwī the additional title of "al-Anṣārī," the physician (الانصارى المتطبب). From this, one could infer that al-Zahrāwī is the scion of "al-Anṣār," (الأنصار) the people of "al-Madīnah" (المدينة), and hence the nickname "al-Anṣārī." These were the settlers of the city who united to defend the Prophet of Islam against the people of Mecca in 622 A.D., and were thus known as the supporters or "al-Anṣār."²⁾ During and after the Arabic conquest of Spain, a good number of immigrants and warriors from the people of "al-Madīnah," or "al-Anṣār," settled in the Iberian Peninsula. Al-Zahrāwī's ancestry then, one might infer, goes back to the Arabian Peninsula, to the inhabitants of "al-Madīnah," the first city that accepted the message of Islam. His parents, for some unknown reason, moved in or after 936 A.D. to the royal city of al-Zahrā' where their son was born and reared. But we have learned nothing of his childhood or early youth.

Casiri,³⁾ Brockelmann⁴⁾ and other historians refer to al-Zahrāwī's residence and practice at Cordova. Here al-Zahrāwī would have had access to the city's unusual educational facilities of numerous schools and libraries.

Although al-Zahrāwī may have attained his education in Cordova proper—then the cultural and business center of Arabic Spain—we believe that he resided in al-Zahrā' for his practice.⁵⁾ This is a

¹⁾ Abū al-'Abbās Aḥmad Ibn Abī Uṣaybi'ah, *Uyūn al-Anbā fī Ṭabaqāt al-Aṭibbā* (vol. 2, Cairo, 1882), 49, 64.

²⁾ Carl Brockelmann, *Geschichte der islamischen völker und Staaten* (München, 1939), 17.

³⁾ Michael Casiri, *Bibliotheca Arabico-Hispana Escorialensis* (vol. 2, Madrid, 1770), 136-7.

⁴⁾ Carl Brockelmann, *Geschichte der arabischen Litteratur* (2nd ed. vol. 1, Leiden, 1943), 276.

⁵⁾ This inference is drawn from a statement found in the second treatise of

distinction without much difference since the two cities were so close to each other that they were practically one. The historian, al-Marrākushī even included al-Zahrā' as one of twenty-eight widely spread suburbs and quarters of metropolitan Cordova.¹⁾

Whether or not al-Zahrāwī benefited intellectually from the imperial library of al-Zahrā', his writings show what an industrious reader of medical works he must have been.²⁾

AL-ZAHRĀWĪ'S CORRECT NAME

We know the complete name and "nisbah" of the central figure of our research as: Abū al-Qāsim Khalaf ibn 'Abbās al-Zahrāwī (أبو القاسم خلف بن عباس الزهراوي). However, in the Islamic world, some confusion arose as the result of inaccuracy in copying the name of al-Zahrāwī's father, 'Abbās. Thus, both forms "Ibn 'Abbās" and "Ibn 'Ayyāsh" (i.e., the son of 'Abbās or 'Ayyāsh) are encountered in Arabic records. But a thorough examination of early reliable sources and extant Arabic manuscripts of al-Zahrāwī's work helps to disperse the doubts. In general, these documents have called him "Ibn 'Abbās." The other form "Ibn 'Ayyāsh" is mentioned only occasionally in later manuscripts.³⁾ The structure of the two words in Arabic (عباس) and (عياش) is so close that a copyist's mistake becomes understandable. The slightest change in the number and the location of the diacritical marks above or beneath the letters (as in ع or ي and ا or ش) could easily cause the error. Brockelmann already recognized that the correct reading should be "Ibn 'Abbās," not "Ibn 'Ayyāsh".⁴⁾

A more perplexing controversy concerning al-Zahrāwī's correct name arose in the West. This was due to the variety of distorted

al-Taṣrīf. There, al-Zahrāwī refers to a man whom he knew by saying, "He was living [here] in our midst in al-Zahrā'" (كان عندنا بالزهراء). Al-Zahrāwī could have made such a statement only if he were a resident of al-Zahrā' at the time to which the statement refers. (Len. fol. 230).

¹⁾ Ibn 'Idhārī al-Marrākushī, *al-Bayān al-Mughrib fī Akhbār al-Andalus wa al-Maghrib*, G. S. Colin and E. Lévi-Provençal, eds. (vol. 2, Leiden, 1951), 232.

²⁾ e.g., Wien, 476 A, fol. 2v.

³⁾ Ibn 'Ayyāsh was also copied by the eminent seventeenth century historian of Arabic Spain, al-Maqqarī, *Nafḥ al-Ṭib* 2, 119.

⁴⁾ Brockelmann, *Arabischen Litteratur*, I: 276.

transliterations into Western languages of his first name, Khalaf; his title name, Abū al-Qāsim; and his nickname, al-Zahrāwī. ¹⁾ The difficulty became significant when not a few historians of the health field thought of "Albucasis" as an original and distinguished author, and of "Alsaharavius" as a second person who was not only a compiler but a plagiarist. Such confusion, however, has been dispelled by modern scholarship. Leclerc stated in more than one place that the identity of "Albucasis" was established by Schenck in his *Biblia Iatrica*, and that Freind should have given credit to Schenck. ²⁾ But Freind had later arrived at the same conclusion as Schenck through independent research. ³⁾ Leclerc and Fisher further confirmed that any distinction between Alsaharavius and Albucasis is baseless. ⁴⁾

AL-ZAHRĀWĪ THE PHYSICIAN

The intellectual achievement of al-Zahrāwī has been responsible, for the most part, in establishing his good reputation. Concerning his professional career, however, concrete information is scanty. This leaves a wide gap for speculation, even after piecing together the few inferences that could be drawn from al-Zahrāwī's own writings and from sparse data in the literature.

Gayangos and several other scholars, especially of more recent times, refer to al-Zahrāwī as a court physician to Caliph al-Nāṣir

¹⁾ The first name, Khalaf, has been transliterated: Halaf, Galaf, Schalaf, deKhalaf, Khalf, Gafar, Calag, and Chalaf. Abū al-Qāsim has been transliterated: Abulcasis, Buchasis, Abul-Kasem, Bulchasin, Bucasis, Abucasis, Abulcasim, Abucasem, Albucasis, Albucasa, Albucazi, Albucasem, Bulcasem, Bulcaris, Albucrasis, Cusa.

Al-Zahrāwī, as nickname, was modified in various ways, so that in some cases it is hard to recognize it:

Alsaharavius, Alzaharavius, Al-Zahararius, Alzahrawi, Al-Zaharavi, Alzahravii, Alsaravius, Alsahrawi, Alsaravius, Azaravius, Alzarabi, Azaragi, Azarawi, Acaravius, Azaramis, Azrareus, Ezzahraui, Acaragui, Benaberazerin, and others closely related to the above.

We hope the above lists will serve as a convenient reference for future consultation if the reader encounters unfamiliar variants of al-Zahrāwī's name.

²⁾ Leclerc, *Histoire*, 444-5.

³⁾ Johannes Freind, *The History of Physick* (vol. 2, London, 1726) 126-8.

⁴⁾ George J. Fisher, "Abul-Casem Chalaf ebn-Abbas al-Zaharavi, commonly called Albucasis," *Annals of Anatomy and Surgery*, 8 (July-December, 1883), 21-3.

(d. 961). ¹⁾ Gurlt, ²⁾ Sarton, ³⁾ Mieli, ⁴⁾ and others speak of him as a court physician serving Caliph al-Mustansir (reigned 961-76), while a third group states that he was a court physician for both caliphs. ⁵⁾ Leo Africanus, however, affirms that al-Zahrāwī had been the physician-in-ordinary to Ibn Abī 'Āmir al-Manṣūr (d. 1002 A.D.) ⁶⁾ who although legally only the court chamberlain, was actually ruler of Arabic Spain under the nominal authority of Caliph Hishām II (976-1009).

Such assumptions, although based on uncertain evidence, were traditionally accepted. But a search of al-Zahrāwī's works and those of his contemporaries reveals no confirmation of this royal association. While it is clear that he lived during the reign of the two greatest caliphs of the Umayyads in Spain, who encouraged and patronized cultural activities, no early Arabic source known to us mentions al-Zahrāwī's service to the court or government. Moreover, his work was not dedicated to, or named after, a caliph or a patron, as was that of al-Rāzī ⁷⁾ and many others. As a scholar or a teacher—both roles actually being explicit in his own writings and his title of "al-Shaykh"—he may have been wholly devoted to his studies, practice and teaching, without enjoying any appointment to the royal palace.

AL-ZAHRĀWĪ IN HISTORY

One of the earliest and most interesting historical accounts in-

¹⁾ Pascual de Gayangos, *The History of the Mohammedan Dynasties in Spain* (vol. 2, London, 1843), 149.

²⁾ Ernst J. Gurlt, *Geschichte der Chirurgie und ihrer Ausübung* (vol. 1, Berlin, 1898), 620.

³⁾ George Sarton, *Introduction to the History of Science* (vol. 1, Baltimore, 1927), 681.

⁴⁾ Aldo Mieli, *La Science arabe et son rôle dans l'Évolution scientifique mondiale* (Leiden, 1938), 182.

⁵⁾ Hasan Wafā Dijjānī, *Geschichte der arabischen Medizin in Spanien* (Hamburg, 1934), 27.

⁶⁾ Ahmad Maulavī Azīmu'd-Dīn, *Catalogue of Arabic and Persian Manuscripts in the Oriental Public Library at Bankipore* (vol. 4, Calcutta, 1910), 28; the same quotation from Leo Africanus was also referred to by Leclerc, *Histoire*, 1: 437.

⁷⁾ al-Rāzī dedicates his *Kitāb al-Manṣūrī*, (كتاب المنصوري) called in Latin *Liber ad Almansorem* to his friend and patron Manṣūr ibn Ishāq (not Ismā'īl). Muḥammad ibn Ishāq Ibn al-Nadīm, *al-Fihrist* (Cairo ed. n.d.), 415.

cluding precious information about al-Zahrāwī is the previously mentioned epistle of Ibn Ḥazm (994-1064). Ibn Ḥazm there refers to his acquaintance with al-Zahrāwī himself by saying, "waqad adraknāh wa shāhadnāh (وقد أدركناه وشاهدناه). This classical Arabic phrase has been interpreted in various ways.

It was translated by Gayangos as, "[Al-Zahrāwī] whom I know and with whom I was on good terms of great intimacy," ¹⁾ a statement from which Gayangos inferred that al-Zahrāwī was a contemporary of Ibn Ḥazm.

Azimu'd-Din referred to this conclusion as "incorrect." According to the latter, the phrase means: "I obtained the work [*al-Taṣrīf* of al-Zahrāwī] and witnessed or saw it." Hence the original passage, according to Azimu'd-Din, does not assume that Ibn Ḥazm was a contemporary to al-Zahrāwī, as supposed by Gayangos, "it simply indicated that the author of the epistle [Ibn Ḥazm], hearing of the fame of this great work [*al-Taṣrīf*], obtained a copy of it." Then Azimu'd-Din goes on to say "this can be safely assumed, that between the composition of Al-Zahrāwī's work and that of Ibn Ḥazm's epistle a long enough time must have elapsed to establish the fame of *al-Taṣrīf* in the learned society of the Arabs of al-Andalus. This assumption gains further support from the fact that Ibn Ḥazm, towards the end of the epistle, speaks of his contemporaries in the present tense." ²⁾

However, the statement seems to present no real problem. In fact the expression in question is still used in classical Arabic today in the same sense. The true meaning seems to lie between the two previous opinions. Ibn Ḥazm, in saying "waqad adraknāh" indicates that he existed when al-Zahrāwī was still living. It carries the implication that Ibn Ḥazm had probably reached at least boyhood or early youth before al-Zahrāwī died. Also, the word "washāhadnāh" "and we have seen him" means that Ibn Ḥazm saw al-Zahrāwī. He was not only living before al-Zahrāwī's death, but he saw him personally. He had reached by then an age when he could appreciate and later remember 'meeting or even getting acquainted with a figure so prominent as al-Zahrāwī. ³⁾

¹⁾ Gayangos, *History*, 1: 187.

²⁾ Azimu'd-Din, *Catalogue Bankipore*, 4: 28.

³⁾ Leclerc refers to Ibn Ḥazm as a junior contemporary of al-Zahrāwī. He

This could also mean that al-Zahrāwī died a long time before the writing of the epistle. And that is why, in effect, it became necessary for Ibn Ḥazm to say "we have seen him" (*washāhadnāh*). For if al-Zahrāwī only died recently, then it would be pointless to stress such an expression. But al-Zahrāwī being so long dead that a doubt might arise in the reader's mind as to whether Ibn Ḥazm had seen him or not, the latter feels impelled to add an assuring statement.

As a result of this information, we now have two approximate dates within which to confine the life span of al-Zahrāwī. He was surely born in or after 936 A.D., the year of the founding of his native city, al-Zahrā', and he died at an early date in the eleventh century, ¹⁾ a long time before Ibn Ḥazm wrote his epistle. ²⁾

Our reasoning regarding the time of al-Zahrāwī's death receives further confirmation from two rather precise biographical statements. Ibn Bashkuwāl ³⁾ has gone into some detail and given what is probably the earliest well defined biography of al-Zahrāwī that has gone into some detail and survived. It was based mainly upon eleventh century sources considered reliable, such as the reports of Ibn Ḥazm ⁴⁾ and al-Ḥumaydī. ⁵⁾ My [S.H.] English rendering of Ibn Bashkuwāl's account reads:

also quotes an undocumented passage by Conde saying that vizir 'Isā ibn Ishāq and al-Zahrāwī were the two celebrated physicians to Caliph al-Nāṣir. These were the early days of al-Zahrāwī's practice as a physician and we doubt if he was then renowned. Leclerc also endorses the years 912-1013, given by Leo Africanus, as al-Zahrāwī's life span, who on this basis lived to be 101 years old (Leclerc, *Histoire*, 1: 437-439). We believe that the statement about al-Zahrāwī's birth in 912 is confused with the year in which al-Nāṣir started his reign and is not based on historical evidence.

¹⁾ Gayangos, *History*, 1: 468-9.

²⁾ In the light of the above, the other dates that one encounters in the literature are apparently erroneous, such as the assumption of al-Zahrāwī's death in the twelfth century by Freind (*Physick*, 2: 128-9), Casiri (*Bibliotheca*, 2: 137, who was quoted by Wüstenfeld), and Eugene M. O. Dognéc ("Albucasis. Sa vie, son oeuvre," in *Études Archeologiques Linguistiques et historiques* (Leiden, 1885), 304-5). Likewise, the unsupported report by Steinschneider that al-Zahrāwī died in the second half of the eleventh century seems improbable. (Moritz Steinschneider, "Die toxicologischen Schriften der Araber bis End XII. Jahrhundert" in *Virchow's Archiv*, 52 (1871), 482).

³⁾ Khalaf ibn 'Abd al-Malik Ibn Bashkuwāl (1101-1183) was a historian of Arabic Spain and the author of the biographical work *al-Ṣilah*.

⁴⁾ al-Maqqarī, *Nafḥ al-Ṭib*, 2: 119.

⁵⁾ Abū 'Abd Allāh ibn Muḥammad ibn al-Futūḥ al-Ḥumaydī (c. 1029-

"Khalaf ibn 'Abbās al-Zahrāwī, surnamed (يكنى) Abū al-Qāsim: He was mentioned by al-Ḥumaydī who said [of al-Zahrāwī] that he was of distinction in merit, religion and science (العلم). The special field of science wherein he excelled was medicine, in which he wrote a renowned (مشهور) encyclopedic book of great value (كثير الفائدة). From it he omitted all unnecessary detail. He named it Kitāb al-Taṣrīf liman 'Ajiza 'an al-Tālif. It has been mentioned and praised by Abū Muḥammad ibn Ḥazm, who said: Of a truth, in the whole field of theoretical and practical medicine, no other work yet has been written about treating ailments that surpassed it in precision and completeness. He [al-Zahrāwī] died after [the year] four hundred [A.H.] in al-Andalus. He was also mentioned among the great teachers [scholars] (شيوخه) by Ibn Sumayq." ¹⁾

This historical document concerning al-Zahrāwī ²⁾ is significant because it was written by a native biographer who lived only a century after him and who collected data from junior contemporaries of the man and from their students and associates. Therein Ibn Bashkuwāl clearly stated that al-Zahrāwī died after 400 A.H. (1009/10 A.D.) ³⁾

So far as we know, the only historian before the seventeenth

1095) was a student and a friend to Ibn Ḥazm in Spain. He travelled to many countries in the East and died in Baghdād. He is the author of the historical work on learned men of Arabic Spain entitled *Jadhwat al-Muḡtabis* (the full title in Arabic reads جذوة المتتبس في ذكر ولاية الاندلس واسماء رواة الحديث واهل النباعة والشعر). This was probably the first work to refer to al-Zahrāwī. In checking the edition by Muḥammad T. al-Ṭabkhī (Cairo, al-Sa'adah press, 1952), p. 195, No. 421, we found that Ibn Bashkuwāl had copied al-Ḥumaydī, as stated by the former, almost verbatim. We compared this also with the recent edition of Ibn Bashkuwāl's *al-Ṣilah*, by 'Izzat A. al-Ḥusaynī (vol. 1, Cairo, al-Sa'adah press, 1955), p. 162.

¹⁾ Ibn Bashkuwāl, *Kitāb al-Ṣilah*. Franciscus Codera, ed. (vol. 1, Madrid, 1882), 166, No. 368. This biography is similar to that written earlier by al-Ḥumaydī.

²⁾ Ibn Bashkuwāl's biographical sketch was quoted in full by the historian al-Ḍabbī (d. 1203) in his famous work on distinguished men of Arabic Spain Aḥmad ibn Yaḥyā al-Ḍabbī, *Bughyat al-Mullamis fī Tārīkh Rijāl Ahl al-Andalus*. Franciscus Codera and Julianus Ribera, eds. (vol. 1, Madrid, 1884-5), 271-2.

³⁾ The same date and phrasing of the statement has been repeated by the eminent bibliographer Ḥajjī Khalfah (d. 1658 A.D.) (Ḥajjī Khalfah, *Kashf al-Zunūn 'an Asāmī al-Kutub wa al-Funūn* (vol. 1, Cairo, 1856), 211). It was probably Khalfah's account on which Brockelmann and others based their judgment (Brockelmann, *Arabischen Literatur*, 1, 276).

century who gave an exact date for the death of al-Zahrāwī was Leo Africanus. He reported al-Zahrāwī's death in 404 A.H. (1013 A.D.), the year when Cordova was invaded and sacked by the Berbers and the royal palaces of glorious al-Zahrā' were tragically destroyed. ¹⁾ Leclerc and other historians agreed that such a date is probably not far from truth. And so we believe, on this evidence, that al-Zahrāwī probably died between 1010 and about 1013 A.D. ²⁾

Having established as carefully as possible the approximate dates of al-Zahrāwī and described the environment in which he lived, let us now look more closely into his influence on succeeding generations, and after that examine his work.

¹⁾ Reinhart Dozy, *Histoire des musulmans d'Espagne* (vol. 3, Leiden, 1861), 308-311.

²⁾ The Arabic words (مات . . . بعد الأربعمائة) used by Ibn Bashkuwāl carry an implication of soon after 400 A.H. This makes the approximate death date of 1010 to 1013 less speculative.

CHAPTER THREE

THE WRITINGS OF AL-ZAHRĀWĪ REACH THE WEST

THE TRANSMISSION PERIOD

Although Arabic civilization politically menaced medieval Europe, nevertheless the two were linked "by a hundred ties that even war and fear could not sever."¹⁾ Such express European cultural ties with any other Eastern civilization, save those of the Jewish religious and literary legacy, are difficult to find.

But wherever Arabic culture reached in Europe during the late Middle Ages it captured favorable attention. This is true of its influence on the healing arts. While Arabic authors were standing on the shoulders of the ancient Greeks, their contributions to Western Europe still seem indisputable,²⁾ and seemed far more impressive when first revealed to Western scholars.

Numerous Arabic works were translated into Latin or other Western languages, during the twelfth and thirteenth centuries. This began at a time when classical works—including writings in the health field—were known mainly through extracts. These translations from the Arabic made such an impression that even when Western scholars had direct access to the original Greco-Roman classics, upon which Arabic learning was mainly based, they often continued to rely with great reverence upon some of the translated Arabic works. Examples in the medical field are the works of such figures as al-Rāzī and Ibn Sīnā from the Eastern caliphate and al-Zahrāwī from the Western Caliphate.

Here we are mainly interested in al-Zahrāwī, a man whose work remains highly reputed without being either well known in its content or adequately evaluated. Al-Zahrāwī provides a good example of what happened to Arabic culture after it reached the West.

¹⁾ H. A. R. Gibb, *Ibn Battuta* (London, 1929), [i].

²⁾ Rom Landau, *Arab Contribution to Civilization* (San Francisco, 1958), 8-9; also David Riesman, *The Story of Medicine in the Middle Ages* (New York, 1935), 49-59, and De Lacy O'Leary, *How Greek Science Passed to the Arabs* (London, 1949), 3-5.

In the literature, as far as we can judge, there seems no foundation for a positive stand. Because if "several famous writings" mentioned by Uşaybi'ah were other than the treatises of *al-Taşrîf*, why were they not mentioned elsewhere in the literature? It is also worth noting that Uşaybi'ah—in his medical studies, practice, residence and travels—did not go beyond the borders of the Eastern Caliphate, mainly Syria and Egypt; his acquaintance with Arabic Spain was based on previous biographies and oral reports from a variety of sources.¹⁾ More over, he did not mention seeing any of al-Zahrāwī's writings, as he customarily did if he knew a work at first hand. We are, therefore, led to believe that Uşaybi'ah probably meant the thirty treatises of *al-Taşrîf*.

Also considering al-Zahrāwī's reputation, one might presume that if he had written another work it would have been found and commented upon or at least mentioned, in the literature. However, not a single authentic manuscript, other than those belonging to *al-Taşrîf*, has been reported. Thus, relying on available evidence, one concludes that *al-Taşrîf*—a work he wrote late in his life—is the only literary contribution of al-Zahrāwī that survived through the centuries.

THE TRUE MEANING OF THE TITLE

The word *al-Taşrîf* has been often used to designate the work of al-Zahrāwī. This was done only for the sake of convenience. The full title of the work reads *Kitāb al-Taşrîf Liman 'Ajiza 'an al-Taşrîf* (not *al-Ta'ālîf*) (كتاب التصريف لمن عجز عن التأليف), a title that causes certain difficulties for historians and translators.³⁾ The true meaning has not been generally agreed upon. In some cases the interpretations come close but not exactly to the point. Others transliterate

¹⁾ Amin A. Khairallah, *Outline of Arabic Contribution to Medicine and Allied Sciences* (Beirut, 1946), 34-5.

²⁾ Wien, 476A, fol. 2b.

³⁾ Aldo Mieli, *La Science arabe et son rôle dans l'évolution scientifique mondiale* (Leiden, 1938), 182. Moritz Steinschneider in his, *Die europäischen Übersetzungen aus dem arabischen bis Mitte des 17. Jahrhunderts* (Leipzig, 1956), pp. 55-56, voiced the same feeling that it is hard to find an equivalent for the meaning of the Arabic title, and especially the word *Taşrîf*.

the Arabic title unsatisfactorily, or coined titles irrelevant to the actual subject matter.¹⁾

Actually, the title was presented and explained in clear and simple terms by the author himself. Therefore, let us try to clarify the question by looking for the motives that led him to choose such a title.

In the introduction to his work al-Zahrāwī writes: "And I have named it *Kitāb al-Taşrîf Liman 'Ajiza 'an al-Tālîf*, because of its wide-range usefulness in serving the physician in a multitude of ways. [The physician] comes to its satisfying counsel with all kinds of problems, as necessity arises. And due to its availability he need not resort to extensive reading of the various compendiums and the detailed writings from the East. Neither will he be compelled to [consult] the inexplicable works of the ancients, inasmuch as the intellectual benefits thereof cannot be gained save by spending long years at hard study and continuous, strenuous investigations."²⁾ This is a clear explanation, and it seems an honest one in view of the author's apparent instructive purposes throughout this whole undertaking. For he meant *al-Taşrîf* to be a daily guide and a manual to be used, referred to and relied upon, by his students—whom he calls his children—and by practitioners.

The reader will find access to the true meaning of the title through the above translated portion of the author's introduction.

THE TREATISES: THEIR NUMBER, SEQUENCE AND CONTENT

Al-Taşrîf is characterized by an encyclopedic nature and outlook. It embraces a wide range of topics touching the various branches of the health field known and developed at the time. Some novel features will be discussed later.

Many translators and medical historians have presented inaccurately the number³⁾ and the sequence⁴⁾ of the treatises in

¹⁾ See, for example, Fielding H. Garrison, *An Introduction to the History of Medicine* (4th ed. rev., Philadelphia, 1929), 131-2; Ralph H. Major, *A History of Medicine* (Springfield, Ill., 1954), 250; and Heinrich Haeser, *Lehrbuch der Geschichte der Medizin und der epidemischen Krankheiten* (vol. 1, Jena, 1875), 578.

²⁾ Madr. 5007, fol. 1 b.

³⁾ For example, Johannes Freind, in *The History of Physick* (vol. 2,

CHAPTER FIVE

GENERAL SURVEY OF THE CONTENTS AND STRUCTURE OF *AL-TAŞRÎF*

EARLIER APPROACHES TO SYSTEMATIC STUDY

Al-Taşrîf embraces within its thirty treatises the various fields of the healing art then known. The work resulted from more than forty years ¹⁾ of intelligent study and personal observation. Each of these treatises, although an integral part of the whole, has a separate identity of its own. ²⁾ Yet, certain treatises can be organically linked together, a fact that justifies systematic classification of the whole.

A number of attempts have been made along these lines in the past. But most constructions seem based upon an inadequate concept of the contents. During the late Middle Ages in the West, the first two treatises together with the twenty-eighth, *Liber Servitoris*, were sometimes regarded as al-Zahrāwī's whole *al-Taşrîf*. Until almost the nineteenth century, medico-historical research to elucidate the character of the work centered upon comparing this portion of *al-Taşrîf* with the surgical part, which was also well known. ³⁾ Some came to think of the work as being organized into two major parts, the theoretical and the practical. Probably because of the attention given to the edition of *Liber theoricæ nec non practice* (1519), this misleading division became traditional through the centuries. ⁴⁾

So far, one of the best general analyses concerning *al-Taşrîf* has been the interesting study made by Leclerc, ⁵⁾ and his research was

¹⁾ Vel. fol. 228 b. and Madr. 5007, fol. 1a.

²⁾ Wien 476B, fol. 5 B. and Madr. 5007, fol. 1 b.

³⁾ Lucien Leclerc, *Histoire de la médecine arabe* (vol. 1, Paris, 1876), 441-3.

⁴⁾ Ferdinand Wüstenfeld, *Geschichte der arabischen Aerzte und Naturforscher* (Göttingen, 1840), 85.

⁵⁾ Leclerc, "Abulcasis; son oeuvre pour la première fois reconstituée," in *Gazette hebdomadaire de médecine et de chirurgie*, 2nd ser. No. 34-36, 11 (1874), 537-48, 569-78, which was largely incorporated into and elaborated upon in his *Histoire*, 1: 437-57.

heavily relied upon by Valensi.¹⁾ But even Leclerc's treatment was broad and general, corresponding to the wide scope of his monumental history of Arabic medicine. Hence, he was prevented from discussing in detail the contributions of individual physicians.

In view of the renown of his survey, we wish to make a few remarks about what Leclerc did and did not do with regard to *al-Taşrif*. First, Leclerc did discuss treatises one and two, although sparingly. Second, he did consider treatises three to twenty-five as a unit concerned with the study of compounded drugs. Third, he made a rapid assessment of treatises twenty-six to twenty-nine inclusive. Last, he elaborated upon the surgical part,²⁾ which he previously had rendered in a scholarly way into French.

But Leclerc did not describe the actual content of the majority of the treatises, not even their titles. Those treatises that he did mention were only viewed in the light of earlier assumptions that came to us from the Middle Ages. Moreover, in rendering into French some titles, which often are distorted or incomplete, Leclerc apparently relied on the Latin version rather than the Arabic—for his quotations all were Latin. Finally, he exaggerated the application of a statement by Ḥajjī Khalfah (d. 1658 A.D.).

As Leclerc did not give a French translation of Khalfah's report, here is a rendering into English: "Al-Taşrif . . . was divided by him [al-Zahrāwī] into thirty treatises, the majority of which are on compounded drugs, (واكثرها في الأدوية المركبة) by the system followed in earlier medical compendia (الكتايبات)." ³⁾

¹⁾ Robert Valensi, *Un chirurgien arabe, Abulcasis* (Montpellier, 1908), 30-39, 85-96; a thesis that did not reach either new viewpoints or normal scholarly standards.

²⁾ Leclerc, *Histoire*, 1: 446-457; and Fidel M. Fernández, *La Medicina arabe en España* (Barcelona, 1936), 56-61.

³⁾ In the phrase (على طريق الكتايبات), translated "by means of compendiums," we follow Ḥajjī Khalfah, *Lexicon Bibliographicum et Encyclopaedicum a Mustafa ben Abdallah K. Jelebi (Haji Khalfa)*, Gustav Fluegel, ed. (vol. 2, Leipzig, 1837), 302-303 or No. 3034. We accepted this rendering because it conforms to the concise style and comprehensive scope actually found in *al-Taşrif*. The word "metonymies" (الكتايبات) as rendered in the edition of Ḥajjī Khalfah, *Kashf al-Zumūn 'an Asmā al-Kutub wa al-Funūn* (vol. 1, Cairo, 1856), 221 seems to be a copyist error. Khalfah's other edition (vol. 1, Istanbul, 1941), 411-412 agrees with Fluegel, using also the word "al-Kunnāshāt (الكتايبات)".

We agree that compounded drugs are discussed in the majority of the treatises, yet this does not imply, as Leclerc apparently thought,¹⁾ that they are wholly devoted to such information. Furthermore, Khalfah's acquaintance with *al-Taşrîf* perhaps was not as thorough as Leclerc assumed, since in discussing surgery Khalfah names a number of Arabic surgeons without mentioning al-Zahrāwī at all. He neither refers to al-Zahrāwī's surgical treatise nor to his significant drawings of surgical instruments.²⁾

Later on, we shall see that what Khalfah, and following him, Leclerc, referred to as compounded drugs consists of more than is commonly understood by that term. It is a systematic and organized pharmaceutical study, including compounded drugs, pharmaceutical preparations and technic, and various forms of medications administered in the healing art. These wider aspects form a central part of the present study.

Leclerc's approach perhaps inspired later historians to divide the entire *al-Taşrîf* into three parts: the medical; the pharmaceutical and chemical;³⁾ and the surgical.⁴⁾

A NEW APPROACH TO CLASSIFICATION

The need for a fuller and more revealing classification of the contents of *al-Taşrîf* seems clear. This work was divided by its author into treatises (معالجات), sections (أبواب), chapters (فصول) and so on, rather typical of the elaborate classification noted in medieval Arabic works. In spite of its systematic organization, *al-Taşrîf* does not lend itself to unified topical classification as easily as might be supposed from the first look.

Two difficulties might be mentioned: First, a number of the treatises overlap as to subject matter. Therefore, it is hard to decide where each should be classified. (Probably this seems disturbing only because of modern insistence that rational medicine be cleanly subdivided and specialized.) Second, certain individual treatises embrace materials related to more than one general topic. Thus,

¹⁾ Leclerc, *Histoire*, 1: 444.

²⁾ Hājji Khalfah, *Kashf*, 1: 299.

³⁾ The word chemistry and its derivatives is used in this study as it was understood in the late Middle Ages.

⁴⁾ Aldo Mieli, *La Science arabe et son rôle dans l'évolution scientifique mondiale* (Leiden, 1938), 182.

there exists a risk to proper understanding in placing such a treatise in one category or the other. With these cautions in mind, we proceed.

THE CONTENT OF AL-TAŞRÎF BY CATEGORIES

We can divide the work into eight main categories. Each will embrace the treatises devoted primarily to the same general topic. In cases of overlapping, we shall indicate which category we prefer and the reason for it.

Our rearrangement of the work in these main categories constitutes an alteration of the author's structural approach as seen in the table of contents. We are imposing our own structural scheme on *al-Taşrîf* to make more apparent its scope, relative emphasis, and character. Here then is an overview according to the eight categories:

I. The author's introductions and epilogues, his personal aims, ethical advice, and professional principles.

II. General and clinical medicine, embracing: medical theories and definitions, nature of man and temperament, anatomy, pathology, classification of diseases, symptoms and treatment. It constitutes treatises one and two.

III. The surgical part, with illustrations of instruments for instructional purposes, consisting of the thirtieth treatise.

IV. Pharmacology and therapeutic treatment of a variety of diseases: treatises six, eight, twelve, twenty-one and twenty-three.

V. Pharmacology and therapeutic treatment of a specific ailment or organ: treatises nine and twenty-two.

VI. Hygienic and dietary regulations in sickness and health, and the relation thereof to medical practice: treatises twenty-six and twenty-seven.

VII. Preparation and stability of drugs, admissible substitutions, weights and measures, drug synonyms and terminology, pharmaceutical manufacturing and technique (including extraction, filtration, collection and storage): treatises twenty-eight and twenty-nine.

VIII. Materia medica, therapeutic "virtues" of simple and compounded drugs in the treatment of the various diseases, pharmaceutical forms and dosages of medication, and the methods of

their preparation and administration: treatises three, four, five, seven, ten, eleven, thirteen, fourteen, fifteen, sixteen, seventeen, eighteen, nineteen, twenty, twenty-four and twenty-five.

By thus grouping related materials together for the purpose at hand, we can now briefly describe the content of each category to provide a readily comprehensible survey. However, in discussing the individual categories, we shall try to place al-Zahrāwī's writings in perspective by making some comparisons with a classical writer and a contemporary Arabic writer who had similar objectives. The first will be Paulus Aegineta, a seventh-century Byzantine physician,¹⁾ representing late classical writers²⁾ who greatly influenced Arabic thought.³⁾ The second celebrated physician with whom we shall bring al-Zahrāwī into comparison particularly is his contem-

porary, 'Alī ibn 'Abbās al-Majūsī (علي بن عباس المجوسي) (d. 994 A.D.), known to the West as "Haly Abbas."⁴⁾ The work of al-Majūsī, known as al-Malikī (الملكي) or *Kāmil al-Ṣinā'ah al-Ṭibbīyah* (كامل الصناعة الطبية),⁵⁾ was highly praised by al-Qiftī as practical, comprehensive, and well organized.⁶⁾

¹⁾ Paulus Aegineta, a Byzantine Greek, flourished more than three centuries before al-Zahrāwī, in Alexandria during the early days of Islam and was known among the Arabs as "the obstetrician." He wrote his compendium of medicine in Greek, compiled from Galen, Oribasius, and others, in seven books. Although Oribasius, the famous physician of the fourth century, was also well known in Islam, yet the largest part of his writings was lost (Lynn Thorndike, *A History of Magic and Experimental Science* (vol. 1, New York, 1923), 569).

²⁾ According to Max Meyerhof and G. P. Sobhy (*The Abridged Version of "The Book of Simple Drugs" of Aḥmad al-Ghāfiqī* (Cairo, 1932), 9), there is no modern edition of the work of Paulus in Greek. They therefore recommended "the excellent translation with commentary by Francis Adams, *The Seven Books of Paulus Aegineta*, 3 vols., London, 1845 (1844)-7," which we shall use in this study.

³⁾ Amin A. Khairallah, *Outline of Arabic Contributions to Medicine and the Allied Sciences* (Beirut, 1946), 21.

⁴⁾ While al-Zahrāwī practiced at the capital of the Western caliphate in Spain, al-Majūsī—originally from al-Ahwāz in southwestern Persia—flourished under the Eastern caliphate in the days of the great patron of learning, 'Aḍud al-Dawlah (949-982 A.D.) We have no evidence, neither in tradition nor in historical documents, that either one knew the writings of the other or that they ever met.

⁵⁾ In this study we shall use the first printed edition of the work (*Kāmil al-Ṣinā'ah al-Ṭibbīyah*, 2 vols., Cairo, 1294 A.H. (1877 A.D.)). Two Arabic

In comparing al-Zahrāwī with these two men emphasis will be put upon some of the pharmaceutical aspects of *al-Taşrîf*, particularly in categories seven and eight. However, our intention is to present at the same time an overview of the whole *al-Taşrîf*.

THE EIGHT CATEGORIES

I. *Introductions and Epilogues.*

The few brief preludes and postludes associated with several treatises of *al-Taşrîf* provide interesting data not otherwise accessible in extant historical records. They shed a little light upon the personality and professional life of the author, explain his intentions, and offer ethical advice and professional principles.

Here al-Zahrāwī addresses his "children" (يا بني), a term probably used in a figurative sense. It could of course mean children of his own studying the art of healing, but more likely refers either to the anticipated unseen students into whose hands will come one of the copies of *al-Taşrîf*, or closely associated students under his personal tutelage. We know of no evidence for or against any particular interpretation, but we are inclined to believe that al-Zahrāwī was addressing his students.¹⁾ Thus he appears to have been an ardent teacher who presented *al-Taşrîf* primarily for guiding, instructing, and admonishing his students. He writes, "For your sake I have written this book, my children, for you alone."²⁾

Al-Zahrāwī urges his students to put more effort in studying their assignments carefully, and to apply what they learn in their close contact with patients. He advocates specialization in the health field, in a time and a state where the physician often was a theologian, or astronomer, or a philosopher as well. Al-Zahrāwī tends to stick closely to the practice and technique of his profession; and we

manuscripts also have been consulted (on microfilm): the Damascus manuscript at al-Zāhiriyyah Library, No. 7565 General (275 folios) and the manuscript of the National Library of Medicine, at Washington, D.C., Sommer No. A 26 Item 2, dated 1726 A.D. We wish here to express our gratitude to al-Zāhiriyyah Library and the National Library of Medicine for their courtesy in allowing the microfilming and study of the two manuscripts.

^{a)} 'Alī ibn al-Ḥasan al-Qiftī, *Ikhbār al-ʿUlamā bi Akhbār al-Ḥukamā* (Cairo, 1326 A.H. (1908 A.D.)), 155-6.

¹⁾ Madr. 5007, fol. 35.

²⁾ Madr. 5007, fol. 1 a.

know of several occasions when he shunned dialectical arguments (see, e.g., Wien 476B, fol. 91b-93b.)

Nevertheless, it seems that he follows certain themes that had been touched upon earlier by Paulus Aegineta. As al-Zahrāwī writes to instruct his "children," so does Paulus. They both felt the need for systematizing medical knowledge into a single practical manual for use by students of medicine as well as by practitioners. Paulus argued that lawyers—who generally practice in cities where an ample supply of books is available and who usually do not need to find the required information instantly—have compendiums of their own; then how much more urgent is it for a physician—who practices not only in cities but in small villages, in deserted areas and on ships far at sea—to have compendiums pertaining to their field, to consult promptly when need that cannot be postponed, arises. ¹⁾ The same theme, but without comparison with the profession of law, is elaborated upon by al-Zahrāwī. Indeed, he incorporates the idea into the title of his book.

Al-Zahrāwī goes further than Paulus in presenting two aspects: first, a series of ethical admonitions to his „children” about their professional career; ²⁾ second, and more important, a plan to give special attention to pharmaceutical preparations and their administration in medical treatment. ³⁾

The preface to the work of al-Majūsī, however, differs in two respects. First, unlike al-Zahrāwī, he dedicates the work with flowery praises to his patron, ‘Adud al-Dawlah. ⁴⁾ Second, al-Majūsī gives an interesting, brief biographical survey, including eminent Greek, Syriac and Arabic physicians up to his time. It presents general critical notes that evaluate the physicians and their writings. ⁵⁾ This al-Zahrāwī did not attempt.

II. General and Clinical Medicine

The subject of general and clinical medicine was considered of

¹⁾ Paulus, *Seven Books*, tr. by Adams, 1: (xvii)-xviii.

²⁾ For this reason Gustav Flügel stated that *al-Taşrîf* contains more advice to practitioners than other Arabic works of the same type (*Die arabischen, persischen und türkischen Handschriften der Kaiserlich-Königlichen Hofbibliothek zu Wien* (vol. 2, Vienna, 1865), 525-7).

³⁾ Wien 476B, fol. 1-2 b.

⁴⁾ Al-Majūsī, *Al-Malikī*, 1: 3.

⁵⁾ *Ibid.*, 3-5.

primary significance by the author. He urges his students to study it carefully; "and after you become well oriented in these first two treatises," al-Zahrāwī adds, "then it will be much easier for you to understand the rest of the text."¹⁾

The first treatise opens with short chapters on the definitions and divisions of the healing art, the elements, the nature of matter, man and disease, meteorology in relation to health, humors and temperaments. These topics were not given any special consideration by Paulus, being mentioned only casually. The same we found to be true in the available part of the voluminous work of *al-Ḥāwī* by al-Rāzī.²⁾ But al-Majūsī surpasses the author of *al-Taşrīf* in devoting a great portion of his first treatise³⁾ and a few sections of the fourth treatise to such studies, with dialectical interpretations added.

In his work, al-Zahrāwī proceeds from such topics to an interesting discussion on human anatomy: the bones, muscles, eye, ear, lung, heart, liver, and so on. While this subject is less emphasized by Paulus, al-Majūsī devotes to it the second and third treatises of *al-Malikī*.⁴⁾

Al-Zahrāwī specifically designates the second treatise as a reference manual for classifying diseases, their symptoms and their treatment. He discusses diseases that are frequently encountered in his time, the number mounting to three-hundred and twenty-five kinds.⁵⁾ As expected, the classical sequence of studying the diseases from the head down to the foot is followed here. Paulus earlier, in his third book, did the same; but al-Majūsī departs from this classical pattern. In the sixth treatise of *al-Malikī* diseases are

¹⁾ Wien 476B, fol. 91 b. — 93 b.

²⁾ A microfilm of the Arabic manuscript of al-Rāzī, *Kitāb al-Ḥawī al-Kabīr* (كتاب الحاوی الكبير), No. 449 from the Osler Library at McGill University in Canada, was examined on microfilm sent as a courtesy from the Osler Library. Al-Majūsī, who flourished a few decades after the death of al-Rāzī, studied the complete manuscript of *al-Ḥawī* and criticized its author for completely neglecting such topics. (*Al-Malikī*, 1: 5).

³⁾ Twenty treatises constitute *al-Malikī*, of which the first equals roughly 4% of the total work.

⁴⁾ Al-Rāzī deals with this topic in his *al-Manşūrī* (كتاب المنصوری) (see P. de Koning, *Trois traités d'anatomie arabes* (Leiden, 1903), 3-89); and no doubt he influenced al-Zahrāwī, as *al-Taşrīf* testifies.

⁵⁾ Madr. 5007, fol. 35 b.

discussed from the point of view of the senses, will, and natural reaction—a physio-psychological approach, in modern jargon. In treatises seven to ten al-Majūsī elaborates upon the importance of diagnosis, while his major discussion of diseases and their treatment is loosely dispersed through treatises thirteen to fifteen and seventeen to eighteen inclusive. Such dispersed material throughout al-Majūsī's text makes it harder for the student or the practitioner to find what he wants. Al-Zahrāwī keeps his attention focused upon the problem at hand so that the reader can easily follow him, as the translated headings for his subsections show:

- The diseases of the stomach are twenty-six.
- The diseases of the fundament are twelve.
- The diseases of the liver are fifty-five.
- The diseases of the kidneys are twenty-five.
- The diseases of the bladder are eighteen.
- The diseases of the penis are seventeen.
- The diseases of the testicles are fourteen.
- The diseases of the uterus are forty-six.
- The kinds of abscesses and tumors are thirty. ¹⁾

The symptoms and treatment of these and other diseases are discussed—each in its section. Much of the material here has been touched upon, with more or less emphasis, by Paulus. Yet, after examining the manuscript of *al-Hāwī*, ²⁾ we feel that al-Zahrāwī was more dependent on al-Rāzī than on Paulus. In the subsection on smallpox and measles al-Zahrāwī copied al-Rāzī almost verbatim. ³⁾ Nevertheless, al-Zahrāwī expresses his own opinion on certain disputed medical points, introducing each with the phrase, "Thus says Khalaf" (his first name).

Finally, al-Zahrāwī concludes this long treatise with a detailed discussion of three kinds of fevers and their treatment. Here he quotes the work of Ishāq ibn Sulaymān al-Isrāīlī, entitled *The*

¹⁾ Len. fols. 1 a., 55 b., 72 b., 91, 102 b., 113 b., 126 b., and Madr. 5007, fol. 147 b.

²⁾ Oslers Ms. No. 449; see such topics as jaundice, headache, child hygiene and treatment, and stomach ailments.

³⁾ Johannis Freind, *The History of Physick* (vol. 2, London, 1727), 124-5. In checking the Arabic text, we found that al-Rāzī's influence on al-Zahrāwī here is great.

Book on Fevers or *Kitāb al-Hummayāt* (كتاب الحميات). ¹⁾ This elaborate chapter on fevers is the 32nd in the treatise, conveniently following the 26th chapter on child health; the 27th on the care of the aged; the 28th on rheumatic ailments, the 29th on pustules, pimples, boils and tumors and their treatment; the 30th on poisons and their antidotes, and the 31st on skin diseases.

III. *The Thirtieth Treatise on Surgery*

We have referred to al-Zahrāwī's surgical treatise in chapter three, in connection with its transmission to and influence on Western Europe since the second half of the twelfth century. Here it is only to be discussed in relation with the other categories of *al-Taşrîf*'s content.

The introduction to this treatise reveals the author's emphasis upon the importance of studying anatomy. This topic has been mentioned under our second category, the text of which is closely related to the thirtieth treatise. In fact the author considers the first two treatises, which form the previous category, a necessary prelude to understanding surgery and its skillful practice. ²⁾ Thus we are led to classify this thirtieth treatise in the category immediately following that of the first two treatises, in spite of its wide separation from them in the original text.

This part of *al-Taşrîf* has probably acquired more recognition and comments than any other. For this reason, and because of our special interest in the pharmaceutical aspect of al-Zahrāwī's work, we here devote to it only a few remarks.

The author divides the thirtieth treatise into three sections. The first and longest section—in 56 chapters—is devoted to cautery, used in no less than fifty kinds of diseases. The second section, in about 99 chapters, describes accurately a great number of operations performed with the knife. Here is probably the first record of interdiction of amputations above the knee and the elbow due to the danger involved. ³⁾ The third section discusses in 35 chapters the treatment of fractures, dislocation of bones, and luxations, and

¹⁾ Len., fols. 307-309.

²⁾ Wien 476A, fol. I.

³⁾ J. Hermann Baas, *Grundriss der Geschichte der Medizin und des heilenden Standes* (Stuttgart, 1876), 184-5.

includes a description of what is now known as the "Walcher position" in obstetrics, and instrumental delivery in parturition. Al-Zahrāwī reportedly was the first to write on the treatment of deformities of the mouth and dental arches, the first to describe hemophilia lucidly, observed that spinal paralysis is caused by injury within the medulla or the cord, and performed with much skill cranioclasty, for delivery of a dead foetus, describing his operation fully.¹⁾

The Surgical Illustrations

Of special interest in this treatise are more than two hundred illustrations of surgical and dental instruments, originally and beautifully portrayed by al-Zahrāwī himself²⁾ for the purpose of instruction. They are probably the earliest of their kind known to have survived³⁾ and are properly esteemed as valuable relics in the health field.⁴⁾ All these drawings the author carefully and clearly explains; and they long influenced the illustration of surgical instruments.⁵⁾ Leclerc felt that these instruments and their use represent a rational approach in surgery that has historical significance.⁶⁾ Freind believed that al-Zahrāwī was the only one up to his time to describe the instruments he used in each surgical ope-

¹⁾ Fielding H. Garrison, *An Introduction to the History of Medicine*, (4th ed. rev., Philadelphia, 1929), 132; on hemophilia, W. J. Bishop, *The Early History of Surgery* (London, 1960), 73; on spinal paralysis and cranioclasty, M. Z. Siddiqi, *Studies in Arabic and Persian Medical Literature* (Calcutta, 1959), xix and xxi, and second "bāb" of the thirtieth treatise of *al-Taşrif*.

²⁾ Wien 476A, fol. 1 a.

³⁾ Ernst J. Gurlt, *Geschichte der Chirurgie und ihrer Ausübung* (vol. 1, Berlin, 1898), 621. Garrison—who erroneously placed the death of al-Zahrāwī in the early 12th century—stated that since Gurlt's time many earlier illustrations of medieval surgical instruments have been mentioned by Sudhoff and others. However, he did not specify any particular one, nor did he explain whether or not such illustrations were meant for instructional purposes as were those of al-Zahrāwī. (Garrison, *Introduction*, 132).

⁴⁾ For a study of the surgical instruments in Latin versions and a survey of the libraries that contain such versions, the reader may consult Karl Sudhoff, *Beiträge zur Geschichte der Chirurgie im Mittelalter* (vol. 2, Leipzig, 1918), 16-84.

⁵⁾ Donald Campbell, *Arabian Medicine and its Influence on the Middle Ages*, (vol. 1, London, 1926), 88.

⁶⁾ Lucien Leclerc, *La Chirurgie d'Albucasis* (Paris, 1861), vi-vii.

ration.¹⁾ While it has been reported that al-Zahrāwī's surgery was mainly founded on the work of Paulus,²⁾ who confessed complete reliance on his Greek predecessors, we have seen that al-Zahrāwī introduced illustrations of surgical instruments for instructional purposes and presented independent information based upon much experience and personal observation.³⁾ His descriptions also tend to be clearer and more comprehensive than those by Paulus.

However, according to Abū Ganīmā, al-Majūsī ranks first among the three in the completeness of his description of surgical manipulations.⁴⁾ Be that as it may, it is clear that al-Majūsī, in his nineteenth treatise on surgery (consisting of 110 chapters), relies heavily on Paulus and al-Rāzī; and his experience in this field is not particularly extensive.⁵⁾ Adams' commentary on the work of Paulus goes further and affirms that al-Majūsī copied "almost everything from Paulus." And although al-Zahrāwī, too, was indebted to Paulus in the writing of the whole surgical treatise, Adams declares that al-Zahrāwī gave "More original matter on surgery than any other Arabian author."⁶⁾

IV. *Pharmacologic and Therapeutic Treatment*

After the general introduction to the health field, the classification of diseases, and the manual operations, let us turn to al-Zahrāwī's discussion of pharmacologic and therapeutic effects of medicines.

In this topical category we start with the sixth treatise on bitter laxatives, including mainly those used, according to the author, for the evacuation of two Galenic humors, black bile and yellow bile (الادوية المسهلة للبرء).⁷⁾ Among such drugs, scammony, aloes,

¹⁾ Freind, *History Physick*, 2:130; and William Nimch, *Alminara de la Medicina arabe* (Mexico, 1944), 69-73.

²⁾ Max Neuburger, *Geschichte der Medizin* (vol. 2, pt. 1, Stuttgart, 1911), 178-9.

³⁾ E.g., see Leclerc, *Histoire*, 1: 454-6.

⁴⁾ Mohammad Subhi Abu Ganima, *Abul-Kasim ein Forscher der Arabischen Medizin* (Berlin, 1929), 9-10.

⁵⁾ Baas, *Geschichte*, 182.

⁶⁾ Paulus, *Seven Books*, tr. by Adams, 2: 247.

⁷⁾ Taym., fol. 144 a.

euphorbium, colocynth, and squill are designated for ailments that require a strong purgative. For this reason the author divided the patients who undergo such treatment into two classes: the healthy persons, and the poor in health. The second class is advised to take a much smaller dose of these strong bitter laxatives than is the first. In administering these drugs, the author quite often—and apparently for therapeutic reasons—recommends the use of warm water.¹⁾

Such medications are generally named either after the major ingredient used, such as safran pills (حَبِّ الزعفران), or to indicate the therapeutic effect, such as the fever pills (حَبِّ الحُمَّى).

Al-Zahrāwī lists a considerable number of prescriptions for treatment of the various diseases. The arrangement of each of these formulas is, almost consistently, in the following form: the title, the ingredients by weight or volume, method of preparing and compounding, the pharmaceutical form, the method of administration, and the recommended dosage. Generally each formula starts or ends with mention of the disease or, more often, the multiplicity of diseases for which this medication is used.

In the same way, the author approaches the writing of the eighth treatise, which centers around the preparation of mild, good tasting laxatives and their therapeutic benefits. This treatise he calls "The Royal" (المقالة الملوكة) because the bitterness and unpleasant odor of the compounds have been masked and the method of preparation improved. As a skilled physician-pharmacist, he seeks ways to make his medications acceptable to certain patients who abhor bitter, smelly drugs. Moreover, he mentions that such patients might vomit if forced to take unpleasant drugs.²⁾

To such considerations Paulus had devoted only a few pages in his seventh book.³⁾ The number of simple and compounded drugs he includes is relatively limited.

Al-Majāsī likewise treats this topic briefly, although more extensively than Paulus did.⁴⁾ Al-Majūsī appears to be greatly influenced by Paulus. For example, in comparing the attraction of a laxative

¹⁾ Taym., 146 a.—9 b.

²⁾ Taym., fol. 154b.—155a.

³⁾ Paulus, *Seven Books*, tr. Adams, 3: 480-4.

⁴⁾ Al-Majūsī, *al-Malikī*, 2: 139-48, 554-5.

drug for excess humors with the attraction of a magnet for iron, al-Majūsī copies Paulus almost verbatim.¹⁾ But it should be mentioned that the pharmacologic effects of laxative drugs are especially elaborated upon by al-Majūsī.

In the twelfth treatise al-Zahrāwī deals with such topics as the properties of aphrodisiacs, consisting of a number of simple and compounded pharmaceutical preparations, and the medications used against obesity and to fatten the thin. He discusses also the treatment recommended both for a deficiency and an excess of semen; and for increasing or decreasing milk in a mother's breast.

A similar approach is observed in the twenty-first treatise. Its three sections are devoted to the following topics: dentifrices and drugs used in toothache and extraction, erosion, gingivitis and gum bleeding, tonsillitis, and throat troubles. For his prescriptions al-Zahrāwī employs drugs of animal origin—as others did long before and after him—as well as drugs from the mineral and plant kingdoms. Hence, nails, blood, milk, and urine are among the ingredients used for medication that then seemed rational, however bizarre they seem today. Indeed, he rarely appears superstitious, as he does in insisting on using the left horn of an animal and not the right one (see "bāb" 7, of "maqālah" 21).

Generally he seems to emphasize hygienic measures in professional practices. For example, he always requires clean containers, equipment and instruments, and asks for careful washing of raw materials used in drug preparations. He specifies that dry ingredients be finely ground, especially those used in compresses. He prescribes the powders for sprays, or vapor sprays, and for therapy of mouth and throat. He also employs sublingual medications repeatedly.²⁾

The coverage of these topics by Paulus was meager, especially if we consider them from the pharmaceutical or the therapeutic side. He discussed mainly the qualifications of the woman who is to nurse a child, her diet, and how to correct bad qualities of milk; and the problem of an excess of semen.³⁾

Similarly, al-Majūsī gives only cursory attention to these topics,

¹⁾ *Ibid.*, 139-43.

²⁾ Par. 5772, fols. 110-21.

³⁾ Paulus, *Seven Books*, tr., Adams, 1: 5-10, 48.

devoting but three short paragraphs to the following titles: Drugs or diet used as galactagogues; the aphrodisiacs; and the drugs that reduce or dry milk and semen. ¹⁾

Of the three authors, al-Zahrāwī covers these topics much more adequately from the pharmaceutical, the pharmacologic, and the therapeutic point of view.

The twenty-third treatise, the last in this category, discusses the preparation and the application of bandages, dressings, plasters and compresses (الضمادات) to any ailing part of the body. The author commends their use as a technique of great service in medical practice.

Here as in other treatises, besides compiling from earlier works that he considers reliable, ²⁾ al-Zahrāwī adds a few formulas of his own that he had tried (جربناه or مجرب) and found to be worthwhile (انه ينفع). ³⁾

Paulus earlier had devoted special attention to plasters in his seventh book. ⁴⁾ He listed the formulas for ingredients from which a plaster is to be made, with the quantity required of each. Al-Zahrāwī describes not only the methods of preparation and application but the cases in which they are most useful.

Al-Majūsī lists about forty-two prescriptions dealing with the subject. ⁵⁾ He follows closely the procedure presented by Paulus. In the number and variety of formulas he is much surpassed by al-Zahrāwī, who apparently throughout his work devotes more attention to pharmaceutical procedures and preparations than al-Majūsī does.

A possible explanation might be inferred as follows: Under the Eastern Caliphate, pharmacy developed rapidly, and special pharmacists separate from the medical profession, with public pharmacy shops, sprang up so that a physician might not feel a pressing need

¹⁾ Al-Majūsī, *al-Malikī*, 2: 99-100.

²⁾ Al-Zahrāwī was scrupulous in giving credit to authors whom he copied or cited. Among those often cited are Hippocrates, Dioscorides, Galen, Paulus, Ahrun the priest, Māsawayh Sr., Hunayn, Sābūr ibn Sahl, al-Rāzī, Ishāq ibn Imrān, Ibn al-Jazzār, Ibn Juljul, and others.

³⁾ Par. 5772, fols. 140 b., 175 a.—177b.

⁴⁾ Paulus, *Seven Books*, tr. Adams, 3: 558-580.

⁵⁾ Al-Majūsī, *al-Malikī*, 2: 580-5.

for extensive pharmaceutical knowledge. However, in contemporary Spain nothing of that sort is evident; hence there the typical physician was his own pharmacist. This, we may speculate, was one reason for the attention given to pharmaceutical subjects by al-Zahrāwī, a physician who met practical needs in all of his writings.

V. *Special Therapy*

This category is so closely related to the previous one that the two could have been examined together. However, we have reserved the present discussion for material on more specific disease entities.

The ninth treatise of *al-Taşrîf*—the first in this category—as an example, centers around the care and treatment of cardiac diseases. With Galenic tone, al-Zahrāwī attributes the causes of heart ailments to an excess of phlegm that disturbs the body's equilibrium.¹⁾ Therefore in several formulas—which he copied, modified or devised—the author recommends “hot aromatic drugs” to counteract the excess of phlegm and black bile. Such treatment, he asserted, harmonizes with the animal spirit (مشاركة الروح الحيواني).²⁾

Al-Zahrāwī's pharmaceutical preparations, whether simples or compounded, were used with consideration to the “hot” or “cold” (حار or بارد) “qualities,” and to the degrees of hotness or coldness. These formulas represent a variety of pharmaceutical forms: decoctions, potions, syrups, confections, pills, et cetera. In each instance, the author indicates how, with what, and when the medication should be administered.

In his twenty-second treatise, the author leads the reader to expect more specialized and inclusive discussion than he presents (in the copies presently available). In the introduction to the treatise he announces that the comprehensive scope of its text will “stand alone without information being required from other treatises, save in the little known and the scarce.” The major topics discussed here are chest and lung ailments, hoarseness of voice, and asthma, and their treatment. The text is divided into three sections: drugs for the cure of “hot cough,” “cold cough,” and the

¹⁾ Taym., fol. 161 a.-162 a.

²⁾ Taym., fol. 161 a.

intermediate. Here again the text overlaps topics that are broadly discussed in other treatises of *al-Taşrîf*.

To conclude this brief reference to the character of the twenty-second treatise, we can select two points of interest for mention: First, al-Zahrāwī recommends that a thick decoction be used as poultices for chest treatment. When one poultice becomes dry it is to be replaced by another, until the ailing chest is relieved. Second, he emphasizes special diet in the regimen of treatment, following the Hippocratic tradition. Eggs, chickens, fish, and certain dairy products are listed, together with instructions for their use. In addition he urges complete rest for the patient.¹⁾

Paulus had devoted comparatively little to heart and chest ailments. Besides their casual mention in the course of his voluminous work, there are two small related chapters. The first is entitled "On Coryza, Catarrh, Affections of the Trachea, and Cough," wherein two formulas for pills, one inhalation, one decoction and five electuaries were recommended for various kinds of cough.²⁾ Concerning cardiac diseases, Paulus summed up the matter with the statement, "when the heart itself is primarily affected, the case is far beyond all medical aid, occasioning sudden death."³⁾ Therefore he recommended, briefly, certain hygienic measures and special diets.

Al-Majūsī seems to go beyond al-Zahrāwī in the description of the symptoms and the causes of heart ailments.⁴⁾ Yet he is less comprehensive in presenting methods of treatment in the various cases. In dealing with chest ailments, al-Majūsī is objective, clear, and organizes his material well, with special emphasis on the pharmacologic and therapeutic aspects. He divides his discussion mainly into chapters considering the treatment of coughs resulting from ailing throat or trachea; voice coarseness; ailing chest and lung; asthma and oppression; pneumonia; haemoptysis; productive cough; consumption; pleurisy; and lung and chest abscesses.⁵⁾

By and large the physician may find the discussions in the works

¹⁾ Par. 5772, fol. 137.

²⁾ Paulus, *Seven Books*, tr. Adams, 1: 468-473.

³⁾ *Ibid.*, 1: 501-502.

⁴⁾ Al-Majūsī, *al-Malikī*, 1: 357-358, 2: 327-328.

⁵⁾ *Ibid.*, 1: 310-327.

of al-Majūsī and Paulus the more interesting; while al-Zahrāwī's is of greater interest to the pharmacist.

VI. *Hygiene and Diet*

This category embraces treatises twenty-six and twenty-seven. They are closely related in that they both cover the general topic of promoting health by the best possible use of diet and medicine.

The twenty-sixth treatise starts with an interesting introduction concerning the importance of a good diet. According to al-Zahrāwī, a diet should be sought primarily for nourishment and not for its capability of giving pleasure. Nevertheless, nutritious food that is also delicious, he admits, is to be highly recommended, especially in convalescence. He urges practitioners to rely on diet whenever it is satisfactory before resorting to the use of drugs.

The author also discusses varieties of food in regard to their usefulness and harmfulness in different diseases. He divides his text into twenty-eight chapters, including the following topics: special diet recommended for patients stricken with acute diseases, such as smallpox, measles, pneumonia, and itching; and patients with fever, cough, diarrhea, colic, melancholy and jaundice; then a presentation of regimen that helps to reduce or increase weight, increase milk in the mother's breast, or cause diuretic action. This is followed by an interesting discussion of "intermediate" diets that suit most healthy people, and of different kinds of bread and other victuals.

Throughout the text, the author presents the method of preparing each diet in three steps. In the first, he specifies the required quantity of the ingredients. In the second, he describes carefully the technique involved in every process; and third—when the diet is ready—the amount and the time of administration.

The last chapter, the twenty-eighth, speaks of means for obtaining the waters of pomegranate, apples, pears, grapes and the like. For example in preparing the water of sour grape he recommends that sour grapes be pressed, strained and the filtrate put in sunlight for a few days, then strained again, and stored for use by filling the vessel to the brim and closing tightly. For the water of apples, he recommends cooking, mashing and straining the apples, then storing the water thereof in a convenient container, as in the case of sour grapes.

In the twenty-seventh treatise the author divides the text into two major sections: the faculties of regimen and the properties of drugs. The first is subdivided into eleven chapters, including the following topics: grains, bread, and other types of food made of grains; waters, including mineral waters, wines, syrups, honeyed water and vinegar; it also discusses herbs, vegetables and fruits, as well as animals, fowls, and fishes, their products, and uses in diet. Interestingly, the section ends in the eleventh chapter with a discussion on clothes (for use in hot and cold weather), and their colors in relation to climate, as well as the effects of these colors on the eye.

In the first main section of this interesting treatise for the history of hygiene, al-Zahrāwī essentially follows Hippocratic teaching as modified by later writers, particularly Galen. Paulus similarly had discussed in a Galenic tone the powers of the various foodstuffs and their influence to correct the body's temperaments, as well as the qualities and degrees of function of administered medicines.¹⁾

The second section centers mainly on discussing—in alphabetical order—the drugs found or frequently used in the author's native land, Spain. The whole approach is based upon the classical theory of the qualities of hot, cold, moist, and dry, and their four degrees. Al-Zahrāwī may well have been influenced by the elaborate work of al-Kindī,²⁾ especially in assigning grades of humoral qualities to compound drugs as a net product of the additive and the counterbalancing effects of combining several supposedly active constituents.³⁾ Al-Zahrāwī does not go into al-Kindī's complicated calculations and geometric proportions of degrees of faculties, yet he seems to apply such a system in determining the degrees of faculties expected from mixed drugs or diets containing more than two ingredients, and each with its own degree of humoral faculty or action.

¹⁾ Paulus, *Seven Books*, tr. by Adams, 1: 106-178, 3: 2-16.

²⁾ Ya'qūb ibn Ishāq al-Kindī, or Alkindus as known in Latin (d.c. 873), is called "the philosopher of the Arabs." He wrote voluminously on a variety of subjects, including medicine and pharmacy.

³⁾ The classification of the degree of actions or qualities of compounded drugs (more than two ingredients) was the elaboration of al-Kindī and is not found in Galen. Curt Lantzsch, *Abu Jusuf Jakub Alkindi und seine Schrift 'De Medicinarum Compositarium Gradibus'* (Leipzig, n.d. [1921]), 2-7.

Al-Majūsī touches upon similar topics in a traditional way, but he is brief and less concerned with describing the methods used in these preparations.¹⁾

VII. *Practical Pharmacy*

The twenty-eighth treatise, it will be recalled, was transmitted to the West under the title "Liber Servitoris" (see p. 28). The author explains his motives in writing this part. He read in several drug compendiums and *agrābādhīns* that certain medicines have to be obtained and prepared for use in drug compounding before the need arises. This includes medicines made of drugs that are to be pressed for the extraction of juices or that require burning and washing. He realizes the significance of these topics, and also considers that their discussion would give the practitioner a better ability to differentiate between the good product and the inferior one.²⁾ Therefore, he launched upon this study enthusiastically; and he seems to have been filling a gap in the Arabic medical development in Spain that needed attention.

The author divides his text into three major sections, which we shall characterize as to scope and approach. The first section deals with drugs of mineral origin, such as alum, vitriols, lead, iron, copper, and stibnite (الأثمد), an ore from which antimony is extracted. It discusses also how these minerals are obtained, ground, and stored in a convenient container ready for use. Among various processes mentioned are the method of washing tutty (غسل التوتياء)³⁾, the zinc oxide found in chimneys of furnaces in which ores of zinc are smelted; the calcination of mercury and arsenic; and the preparation and washing of ceruse,⁴⁾ which was found in plentiful quantities near Cordova.⁵⁾

¹⁾ Al-Majūsī, *al-Malikī*, 1: 19-22, 177-199.

²⁾ Vel., fol. 1 a. See also P. J. Amoureux, *Essai Historique et Littéraire sur la médecine des arabes* (Montpellier, 1805), 20-25, 74, 116-119.

³⁾ Tutty in its various forms as an ore was likewise discussed in a tenth-century Coptic manuscript. See M. Emile Chassinat (editor and translator), *Un Papyrus médical copte*, (Cairo, 1921), 95-97.

⁴⁾ Apparently the exposure of metal in thin plates in applied chemical processes was known in Arabic lands. (Alfred Siggel, "Buch der aufgehenden Sterne des Muḥammad b. Abī l-Hair al-Hasanī," in *Quellen und Studien zur Geschichte der Naturwissenschaften und der Medizin*, 8 (1942): 140-5). Al-

The second section deals with the preparation of drugs from plants and the care that should be taken to preserve the dried parts, as in the case of dried flowers of violet. Likewise it discusses the extraction of juices, as in the case of aloes; the preparation and straining of gums and the ptyalins (pulp) of certain plants; and the peeling of fruits and seeds, as in the case of quince.

Other methods and techniques of pharmaceutical interest are also included: pressing, and drying (probably for making tablets—see figure 14 a and b—or for the grinding of dried material into powder form); the preserving of the products obtained; and the straining of decoctions and liquids (see figure 15).

Al-Zahrāwī gives the reader other types of pharmacobotanical information also, such as the region in which a plant grows or is obtained, a description of the plant itself, and the method for obtaining the part or parts used medicinally.

Furthermore, this section includes technologic procedures, such as the bleaching of vinegar; the washing of oils and taking out the lees; the making of squill vinegar and distilling the water therefrom; the burning of amber, coral, turpentine, and the vine tree to obtain their ashes for medicinal uses; the improvement of purgative drugs such as scammony and colocynth by the addition of aromatic or good-tasting substances; and the knowledge of the seasons and times for the collection of medicinal plants for future use.

Of interest also is the author's description of the technique and the apparatus used in the distillation of aromatic waters such as rose.¹⁾ Although al-Zahrāwī used and recommended the aromatic water and the oil of rose—together with an interesting description of equipment and technique—²⁾ yet there is no indication that he separated the one from the other during the same process.³⁾

Zahrāwī used thin plates in the preparation of ceruse (white lead), composed of lead hydroxide and carbonate (see Vel., fol. 4 a).

¹⁾ Henry Coppée, *History of the Conquest of Spain by the Arab-Moors* (vol. 2, Boston, 1881), 385.

²⁾ Julius Ruska, "Über die von Abulqasim az-Zahrawi beschriebene Apparatur zur Destillation des Rosenwassers," in *Chemische Apparatur*, 24 (1937), 313-5. See also Bes. 503, fol. 625 b.

³⁾ Bes. 503, fol. 625 b. called to our attention by E. Gildemeister and Fr. Hoffmann, *Die Ätherischen Öle* (3rd. ed., vol. 1, Leipzig, 1928), 27-28.

⁴⁾ R. James Forbes, *Short History of the Art of Distillation*, Leiden, 1948), 31-32.

The third section deals with the preparation of drugs from animal origin, with instructions for distinguishing the good product from the bad. It involves the operation of burning shells, nails, hoofs, bones, snakes, rabbits, and scorpions to reduce them to a form suitable for therapeutic uses. It also discusses the processes for removing biles and brains of fowl, which were used as aphrodisiacs; the collecting of children's urine, to be added to "hot" medicines; the extraction of fats from geese and hens; and the preparation of sal ammoniac (النشادر). ¹⁾

Furthermore, the author presents simple techniques of practical utility—for example, removing foam and purifying of honey, and how honey should be cooked with water; and the bleaching of beeswax by dipping a cold glass cup into a hot mixture of wax and water, then taking the cup out immediately, and exposing the wax collected upon it to sunlight until bleached. ²⁾

This brief survey shows that the fame acquired by this treatise during the Middle Ages and early Renaissance was not inappropriate. It was praised by Leclerc for its independence and interesting merits. ³⁾ In the history of chemistry as applied to medical practice and the compounding of drugs, Cumston went so far as to claim for it a unique originality. ⁴⁾

The twenty-eighth treatise as a reflection of al-Zahrāwī's interest in practical pharmaceutical matters can be better appreciated after it is compared with the works of Paulus, who did not present a special study of preparing drugs as al-Zahrāwī did here. In dealing with substances of mineral origin, such as gypsum, ceruse, litharge, arsenic, mercury, and lead, Paulus presented only a few paragraphs on the symptoms and the pharmacologic effects they produce in the human body. ⁵⁾ He did mention the therapeutic uses of honey and honeyed water, as well as the method of preparing honeyed

¹⁾ For the methods of preparation, properties, and the etymology of the word "nushādur" (the Arabic equivalent of sal-ammoniac), the reader may consult H. E. Stapleton, "Sal-Ammoniac: A Study in Primitive Chemistry," in *Memoirs of the Asiatic Society of Bengal*, 1, No. 2 (1905): 28-29, 40-41.

²⁾ Vel., fols. 48 a-49 b.

³⁾ Leclerc, *Histoire*, 1: 452-453.

⁴⁾ Charles G. Cumston, *An Introduction to the History of Medicine* (New York, 1926), 210, 452.

⁵⁾ Paulus, *Seven Books*, tr. by Adams, 2: 233-8.

water,¹⁾ which were copied almost literally by al-Majūsī.²⁾ In discussing the simples, al-Majūsī's work seems clear and well organized. He divides them as al-Zahrāwī does, according to their origin—plant, mineral, and animal³⁾—but with much less elaboration in regard to the pharmaceutical technique involved.

The twenty-ninth treatise constitutes the second part of this category. It is divided into five sections: the first section gives drug synonyms, mainly in Arabic, Greek, Syriac, Persian and the vulgar tongue (Spanish). In a couple lines or so for each item, al-Zahrāwī gives the Arabic name of the drug and its equivalent in other language or languages (with corrections if any), description, and therapeutic uses. For example, in discussing the melilot (الكليل الملك)⁴⁾ he restricts himself to its definition, its equivalent in other languages, and its uses. He does not go into pharmaceutical botany at length. This fact is underscored by a comparison with Dioscorides,⁵⁾ who gives the following detail concerning melilot: the areas in which it grows, description of the superior and inferior kinds, color, smell, and its therapeutic effects alone or when mixed with other ingredients.⁶⁾

The second section explains synonyms frequently encountered in medical books. They are not synonyms for drugs as in the earlier section, but concern equipment, technical terms, and idioms. The author's aim is to make such terms understood by his readers. For example, he starts with the alembic (الانبيق), and discusses in a couple lines its meaning and usage. This approach is significant to

¹⁾ *Ibid.*, 1: 178.

²⁾ Al-Majūsī, *Al-Malikī*, 1: 199.

³⁾ *Ibid.*, 2: 100-138.

⁴⁾ Vel., fol. 52.

⁵⁾ In this work we are using mainly the Arabic version of Dioscorides' *Materia Medica*, translated by Stiphān ibn Basīl, corrected by Hunayn ibn Ishāq, edited by César E. Dubler and Elias Terés (Tetuán y Barcelona, 1952). This translation is perhaps inferior to that made in Arabic Spain, which was already available in the time of al-Zahrāwī. However, even this more accurate version was apparently incomplete. Heinrich Schipperges, in reviewing the above-mentioned edition, in *Sudhoffs Archiv für Geschichte der Medizin und der Naturwissenschaften*, 39 (1955), 285) prefers, Ibn Basīl's translation. Here, for comparison, the English version, edited by Robert T. Gunther, *The Greek Herbal of Dioscorides* (2nd ed., New York, 1959) was also consulted.

⁶⁾ Dioscorides, *Materia Medica* (Arabic version), 2: 258.

pharmaceutical technology, and we find no equivalent of it in the works of Paulus and al-Majūsī.

The third section is devoted to studying the admissible substitution of one drug for another, if the desired drug is missing or unobtainable at the time, a standard feature of drug books up to the modern period. Here the author emphasizes dosage, as one weight of a drug might equal in its effect either half or double the dose of a substitute.

Although this topic is not given comparable attention by al-Majūsī, Paulus already had given it adequate treatment, drawing "from the works of Galen" a complete list "of medicines which may be substituted for one another."¹⁾ This list possibly influenced al-Zahrāwī later.

The fourth section is concerned with how long certain simples and compounded drugs remain stable before deteriorating. Here again al-Zahrāwī groups drugs according to their origins in the Aristotelian natural kingdoms: minerals, such as gold and silver; plants including gums and seeds; and animal drugs such as those extracted from hoofs, nails and so on.²⁾

Paulus had devoted no special attention to this study in spite of the fact that he described the individual simples in some detail. But in the work of al-Majūsī we find a brief chapter concerning the stability of compounded drugs, such as theriacs, confections, electuaries, and pills.³⁾ In another brief chapter, al-Majūsī emphasizes certain methods and regulations for choosing good quality drugs and the means for proper handling and storing. Then he goes one significant step further by suggesting the detection of the therapeutic effects and potency of drugs by experimenting on human bodies in the various diseases,⁴⁾ a pharmacologic approach of historical interest that al-Zahrāwī has not so explicitly suggested.

The fifth and last section in this category compares and interprets measures and weights.⁵⁾ They are presented in alphabetic

¹⁾ Paulus, *Seven Books*, tr. by Adams, 3: 604-8.

²⁾ Br. Mus., fols. 243 a.-246 b.

³⁾ Al-Majūsī, *al-Malikī*, 2: 533-534.

⁴⁾ *Ibid.*, 2: 85-86; 2: 251-252.

⁵⁾ This section—which has been translated into French and annotated by Sauvaire—is probably the earliest Arabic work of its kind in our possession today; from it Ibn al-Bayṭār borrowed extensively in his chapter on weights

the Arabic title unsatisfactorily, or coined titles irrelevant to the actual subject matter.¹⁾

Actually, the title was presented and explained in clear and simple terms by the author himself. Therefore, let us try to clarify the question by looking for the motives that led him to choose such a title.

In the introduction to his work al-Zahrāwī writes: "And I have named it *Kitāb al-Taşrîf Liman 'Ajiza 'an al-Tālîf*, because of its wide-range usefulness in serving the physician in a multitude of ways. [The physician] comes to its satisfying counsel with all kinds of problems, as necessity arises. And due to its availability he need not resort to extensive reading of the various compendiums and the detailed writings from the East. Neither will he be compelled to [consult] the inexplicable works of the ancients, inasmuch as the intellectual benefits thereof cannot be gained save by spending long years at hard study and continuous, strenuous investigations."²⁾ This is a clear explanation, and it seems an honest one in view of the author's apparent instructive purposes throughout this whole undertaking. For he meant *al-Taşrîf* to be a daily guide and a manual to be used, referred to and relied upon, by his students—whom he calls his children—and by practitioners.

The reader will find access to the true meaning of the title through the above translated portion of the author's introduction.

THE TREATISES: THEIR NUMBER, SEQUENCE AND CONTENT

Al-Taşrîf is characterized by an encyclopedic nature and outlook. It embraces a wide range of topics touching the various branches of the health field known and developed at the time. Some novel features will be discussed later.

Many translators and medical historians have presented inaccurately the number³⁾ and the sequence⁴⁾ of the treatises in

¹⁾ See, for example, Fielding H. Garrison, *An Introduction to the History of Medicine* (4th ed. rev., Philadelphia, 1929), 131-2; Ralph H. Major, *A History of Medicine* (Springfield, Ill., 1954), 250; and Heinrich Haeser, *Lehrbuch der Geschichte der Medizin und der epidemischen Krankheiten* (vol. 1, Jena, 1875), 578.

²⁾ Madr. 5007, fol. 1 b.

³⁾ For example, Johannes Freind, in *The History of Physick* (vol. 2,

and compounded drugs are administered. It starts almost where the seventh category ends, for here we have the drugs from mineral, plant, and animal sources already at hand for compounding according to the prescribed formulas.

The first three treatises in this category in many respects link together, but show differences. For example, the third treatise, which is the first in this category, concerns aged confections that are to be fermented and stored. Al-Zahrāwī commends the good reputation of this form of medication throughout the ages. These preparations, he declares, were used by the ancients over and over again, and found of great value.¹⁾ Kings and rulers kept them in their drug cabinets to be used when need arose. Al-Zahrāwī confesses here that he is compiling what he finds most useful out of many writings. He compares various manuscripts to be sure that he is copying the most accurate ones, since these preparations are to be stored for a long time, and if they are not compounded right, they deteriorate.

The same procedure was followed in the fourth treatise on theriacs. Here al-Zahrāwī begins with an elaborate discussion of the so-called "great theriac" (الترياق الكبير), which was referred to in Arabic as "al-Fārūq" (الفاروق) because it distinguishes this type of preparation from similar confections. After comparing several manuscripts, al-Zahrāwī set down his modified formula, with a procedure in seven stages to prepare the honey as a vehicle, grind the weighed dry ingredients, cook and strain the liquids, and compound all the constituents together in the right proportions. The end product contained no less than eighty-four kinds of drugs, such as honey, psyllium, opium, black pepper, cinnamon, glycyrrhiza, safran, rhubarb, the flesh of vipers, ginger, balm and agaric.²⁾ Therefore, if we were to consider these drugs in the light of their active constituents known in pharmacy at present, they would run up to the hundreds. Since the original purpose of the "theriacs" was as antidotes against various types of poisoning, al-Zahrāwī devotes the last portion of the text to this subject.

In the fifth treatise we learn of the newly prepared and the aged

¹⁾ Taym., fol. 127 b.

²⁾ Taym., 133 b.-134 b.

"hieras" (الايارجات), ¹⁾ including the fermenting process and storage requirements. Here al-Zahrāwī suggests the month of May, when medicinal plants reach ripeness, as the best time of the year in Spain for preparing the "big Hieras." These preparations differ from the previously mentioned confections in containing bitter drugs, such as colocynth and aloes. Due to the esteem in which certain hieras, such as the famous "hiera picra" (the sacred bitters) were held, their use persisted from antiquity to the nineteenth century. ²⁾

The multiplicity of simples contained in the individual formulas—following the trend of the time—shows the author's tendency to promote polypharmacy. However, in simpler form, these types of medication were known in classical writings. Paulus, relying particularly on Galen's work, *De antidotis* (with certain modifications), gives an intelligent explanation of the subject. He divides the antidotes into three kinds: those used against deleterious substances; those against venomous animals; and those to counteract food poisoning. The theriacs, then, are useful antidotes in all three types of poisoning. ³⁾

But al-Majūsī's treatment of the subject perhaps appeals more to modern thought. He first considers the factors involved in the "capability" of antidotes to inactivate poisons or make them harmless and the means by which they rid the body of them. Second, he tries to find out why a theriac acts as it does, how to detect its effectiveness, and the ways to determine the proper dose in the various diseases. Third and last, al-Majūsī discusses the toxicity, symptoms, and treatment of over-doses of certain simples, such as hyoscyamus, digitalis, and aconite, if taken internally ⁴⁾—an interesting forerunner of modern pharmaco-toxicology.

The seventh treatise covers additional forms of pharmaceutical preparations: enemas, pessaries, and rectal and vaginal suppositories. With each formula, as in other treatises of *al-Taşrīf*, the

¹⁾ The Arabic word "iyārij," derived from the Greek, means the bitter medicine (Taym., fol. 140 a.).

²⁾ Arthur Osol, George E. Farrar, et al., *The Dispensatory of the U.S.A.*, (25th ed., Part 2, Philadelphia, 1955), 1613.

³⁾ Paulus, *Seven Books*, tr. by Adams, 3: 510-525.

⁴⁾ Al-Majūsī, *al-Malikī*, 2: 97, 226-233, 526-550.

therapeutic uses of these forms of medications are listed. The text, moreover, contains a few sections on emetic drugs. It overlaps the category of therapy and pharmacology, because these emetic drugs are studied in the light of their effects on the human body. Al-Zahrāwī discusses inducing emesis to get rid of, first, extra yellow bile, second, black bile, and third, phlegm. Drugs that cause vomiting of blood, the fourth humor, are dismissed as hazardous.

This topic had been treated in a comparable way by Paulus, although the forms and number of recipes were less comprehensive than those al-Zahrāwī presents. In the chapter "On Emetics, and the Mode of Administering Hellebore,"¹⁾ Paulus seems to have influenced al-Zahrāwī, who nevertheless goes beyond Paulus in the use of many emetics other than hellebore. The presentation of these topics by al-Majūsī adds nothing of significance.

Tryphera, Electuaries, Syrups and Robs

Here we discuss three treatises concerned with forms of pharmaceutical preparations for internal use. We start with the tenth treatise on the properties of tryphera (الاطريفلات)²⁾ and cathartic nuts. Again al-Zahrāwī refers to various compendiums and medical works he consulted in collecting his material. The text ends with a section dealing with preparations made of seeds and nuts, mainly to induce laxative action or to treat stomach-ache. This section overlaps previously discussed topics.

The next treatise, the eleventh, discusses the properties of electuaries (الخواص الجوارشات)³⁾ cumins and similar paste-like medications. The author praises them highly as useful both in keeping healthy people well and in restoring health to the sick. The last

¹⁾ Paulus, *Seven Books*, tr. Adams, 3: 503-506.

²⁾ The tryphera is another type of confection in dough form, but its basic constituents are the three medicinally famous myrobalans (الأهليلجات): the chebula, the emblic, and the belleric. Later on, other kinds of myrobalan species were added. Sahlān Ibn Kaysān, and Rašīd al-Dīn Abū Ḥulayqā, *Deux traités médicaux*, tr. and ed. by Paul Sbath, and Christo D. Avierinos (Cairo, 1953), 45.

³⁾ Electuaries as a term derives from the Persian language, meaning "food digestives." Basically they are medicinal confections like the tryphera, but the major ingredients are certain aromatic spices, the three kinds of peppers, and ginger (*Ibid.*, p. 47).

section of the text deals with the usual technique used in blending the principal spices with other drugs in forming the different electuaries.¹⁾

Of interest to the pharmacist is the thirteenth treatise on some delightful syrups and the manufacture of robs from various fruits. An example of the latter preparations is the making of grape robs. Ripe grapes are cleaned well and pressed gently. The juice is then strained into a new earthenware vessel, covered with water, and left to stand for three days. Later on, the contents of the vessel are cooked on a gentle fire until three-fourths is evaporated. The resulting grape rob is cooled and stored for future use.²⁾ The methods used in preparing other robs are also skillfully and vividly recorded. The robs were recommended as vehicles to blend other drugs with, replacing the use of honey or sugar syrups. The last section presents methods of preparing syrups containing condiments and aromatic spices, and their properties.

These elaborate pharmaceutical preparations have no equivalent counterpart in the earlier work of Paulus. Al-Majūsī covers similar ground,³⁾ but compared with his contemporary al-Zahrāwī, he is less comprehensive in describing the technique involved and in presenting formulas for various medical uses.

Now we turn to the fourteenth treatise concerning the ordinary decoctions and infusions, and the strong, aromated ones. Basically these preparations were designed to purge the excess of humors, although other therapeutic suggestions were mentioned as well. Certain decoctions were made in the form of a broth or thick soup to be taken on an empty stomach. Other types were to be mixed later with aromatic spices for varied therapeutic effects. Due to the nature of these preparations, the author recommends dispensing them within a short time for fear of deterioration.

Especially of interest to the profession of pharmacy is the fifteenth treatise. It discusses the properties and methods for the manufacturing of conserves made of fruits and flowers and either dry or newly harvested medicinal plants. Al-Zahrāwī emphasizes here that the art of manufacturing conserves depends more on personal

¹⁾ Taym., fols. 177 a-179 b.

²⁾ Taym., fol. 192 b.

³⁾ Al-Majūsī, *al-Malikī*, 2: 572-578, 588-593.

experience and close observation through practical training than on theoretical studies.¹⁾

The author then divides the text into two sections. The first deals with "cold conserves," such as those made of the rose, violet, apple, quince, cucumber, and nenuphar (water lily). The second embraces the "hot conserves," referring to the quality of their "powers," such as peppers, cocoanuts, carrots, and garlic. In certain cases the author mentions more than one method of preparation, as in the conserve of roses. Here, as in the previous three treatises, detailed instructions are introduced concerning methods to be used in adding the aromatic spices and their therapeutic uses.²⁾

In comparing the previous treatises with their predecessors we see in general that forms of medication such as robs, conserves, and the like, probably were not known to the Greco-Roman world.³⁾ Thus, Paulus discussed neither the methods of preparing these forms nor their medicinal uses. Al-Majūsī does mention them, giving a few examples in each case. Yet, he treats them as a physician, more interested in the therapeutic application and effects of a drug than in technical questions about the form of medication. But al-Zahrāwī is interested in both the improvement and perfection of the pharmaceutical preparations as well as in the treatment of his patient.

Powders and Tablets

Because of the importance of powders and tablets or troches as closely linked forms of medication, it seems appropriate to discuss them jointly. The author compares them in an interesting way. He considers powders (which are discussed in the sixteenth treatise) less stable than tablets (seventeenth treatise) because they have more surface area exposed to the air. The penetration of air into the powders hastens the time of their deterioration. In making tablets, the addition of gums (he used mainly acacia and tragacanth) preserves them as honey preserves confections.⁴⁾ Al-Zahrāwī

¹⁾ Tub. 782, fols. 1a-2 a.

²⁾ Tub. 782, fol. 13 b.

³⁾ Edward Kremers and George Urdang, *History of Pharmacy* (2nd ed., Philadelphia, 1951), 35.

⁴⁾ Par. 5772, fol. 1 a.

considers the lack of such preserving agents in powders as one disadvantage. Thus he recommends bulk storage of powders in narrow-mouthed containers to be kept tightly closed, preventing air penetration until the time of use.

Al-Zahrāwī advocates the therapeutic advantage of powders for their drying qualities. They are to be used, according to the author, for drying the excess humidity in the humors, associated with such conditions as diarrhea, frequent urination, cystitis, and hydronephrosis as now known.

Tablets, the author adds, are more useful, and easier to use in travel or at home. They can be administered easily to those who dislike the bitter taste of powders, whether used for laxative or astringent effect.¹⁾

Powder did not receive much attention in the work of Paulus, and al-Majūsī presents only a few, commonly used formulas in Arabic medicine,²⁾ but tablets or troches are elaborated upon by both. We present one formula encountered in all three works, as a comparative example. Our casual choice should not be taken as representative of the entire works of these men, but only as a sample to throw some light on similarities as well as differences in approach on this point. Here is the formula, which contains roses as a major ingredient and hence is known as the rose tablets:

Paulus

"*The trochisk from roses.*—Of acacia, of gum, of the flower of roses, of pomegranate flowers, of the juice of hypocistis, of galls, of each, dr. iiij; of the juice of green roses, of the seed of plantain, of each, dr. j; of Indian buckthorn, dr. j." ³⁾

al-Majūsī

"*Prescription of rose troches.*—Which is useful in stomach-ache and fevers caused by excess of phlegm. Take red rose dr. vi; the root of the glycyrrhiza, dr. iv; nard dr. i; grind, sift and knead [them together] and [make] into tablets. [weight of each], dr. i. ⁴⁾

al-Zahrāwī

"*Prescription of rose troches.*—Which is useful against [excess]

¹⁾ Tub. 782, fol. 40.

²⁾ Al-Majūsī, *al-Malikī*, 2: 578-580.

³⁾ Paulus, *Seven Books*, tr. by Adams, 3: 530.

⁴⁾ Al-Majūsī, *al-Malikī*, 2: 570 (S. H. translation).

of blood in the stomach and the ailments thereof caused from the pouring in of yellow bile. Take of the red rose flowers, dr. iii; the root of the glycyrrhiza, whose top parts are removed, dr. ii; red sandal wood, yellow sandal wood, barberry bark, melilot, of each, dr. i; the pulp of the melon seeds, mastic, spikenard, yellow amber, white tragacanth, of each, dr. i; white chalk, Persian manna, of each, dr. ii; safran, dr. i; grind the drugs, sift and knead them together in dandelion water. Make them into tablets, the weight of each tablet dr. i. The dosage is one tablet to be taken with Oz. 4 of dandelion or black morel. ¹⁾

In viewing this sample, one sees that the brief presentation of Paulus—modified from earlier classical writings—has been added to and therapeutically reinforced by al-Majūsī, and was elaborated still more by al-Zahrāwī, who included new simples to increase its therapeutic uses and offered a fuller explanation of technique and method of administration.

The wide scope of pharmaceutical forms used by al-Zahrāwī becomes still more obvious in the eighteenth and following treatises. Here, for example, the text discusses the following additional types of preparations: the sternutatories, ²⁾ fumigations to kill lice, mice and undesired insects; incenses; effervescent; ear drops (including the squeezed juice of onions); gargles; and fine powders for spraying on wounds, to stop hemorrhage of the nose or in circumcision. ³⁾

The next treatise, the nineteenth, represents al-Zahrāwī in a new guise, that of a cosmetologist concerned with beautifying preparations of all kinds. He divides the text into two major parts of ten sections each. The first part deals with such topics as manufacturing perfumes; mixing spices; distillation of aromatic waters (including safran, sandal wood, and rose waters) ⁴⁾ and the apparatus used; ⁵⁾ anointing oils, in which aromatic spices were incorporated; and

¹⁾ Par. 5772, fol. 23 a. (S.H. translation).

²⁾ The sternutatories actually do not constitute a type of pharmaceutical preparation, inasmuch as the term refers to pharmacologic action.

³⁾ Par. 5772, fol. 31 a.

⁴⁾ The description by al-Zahrāwī of the processes of distillation and calcination, and their importance, has been discussed by Forbes, *Distillation*, 30, 40-41.

⁵⁾ Apparently the apparatus for distilling aromatic waters used by al-Zahrāwī was an improvement upon that used by the Greeks. See Edward O. von Lippmann, *Abhandlungen und Vorträge zur Geschichte der Naturwissenschaften* (vol. 2, Leipzig, 1913), 208.

"al-ghawālī," ¹⁾ which were products of the principal spices and condiments, processed in a special way for medicinal or beautifying purposes. The second part discusses beautifying medications and techniques, and the manufacture of skin and hand lotions, deodorants, dermatologic pharmaceuticals, and hair preparations such as dyes, tonics, removers and curling lotion. These remind us that today we do not have many novelties either in the range of cosmetic practices or in the mindfulness of seeking their improvement.

The twentieth treatise discusses collyria, eye-salves, lotions and eye compresses, especially in the light of their therapeutic and pharmacologic effects. This somewhat overlaps the fifth category. Of pharmaceutical interest is the fact that rose water and gum Arabic (acacia) were among the ingredients mentioned in certain formulas for collyria.

Paulus had presented an interesting study "On Collyria", stating that "the materials from which ophthalmic medicines are composed are various" and then going on to describe them with clarity and orderliness. ²⁾ But we see his interpretations are not as elaborate as those of al-Zahrāwī if we look, for example, at the chapters devoted to fumigations or to perfumes and beautifying agents. ³⁾

Al-Majūsī organizes his material by designating a chapter for each of the following topics: collyria; eye-salves; fine powders for spraying on wounds or for nose bleeding; and dermatologic prescriptions; ⁴⁾ plus a brief chapter on beautifying preparations. ⁵⁾ But there is no detailed mention of distillation of aromatic waters or other pharmaceutical techniques of the type we find in *al-Taşrif*.

The last two treatises in this large category are the twenty-fourth on ointments and the twenty-fifth on the "adhān". In discussing ointments al-Zahrāwī states that while dressings and poultices are used in the various modes of treatment, ointments are recommended specifically for application on wounds, external sores, blains, ulcers

¹⁾ These are not alcoholic preparations—which were not then known to the Arabs (Julius Ruska, "Ein neuer Beitrag zur Geschichte des Alkohols," in *Der Islam*, 4 (1913), 320-4), as Forbes also agrees.

²⁾ Paulus, *Seven Books*, tr. by Adams, 3: 548-556.

³⁾ *Ibid.*, 599-600.

⁴⁾ Al-Majūsī, *al-Malikī*, 2: 595-603.

⁵⁾ *Ibid.*, 77-80.

and blisters. He divides ointments into two types in accordance with their effect upon the ailing organ, either to loosen or to tighten it. These two types are again subdivided—in relation to the kind of medication they hold—into mild emollients, for treatment of children and women, and potent and astringent ointments, for use by men.

Al-Zahrāwī first mentions the renowned "Palm Ointment" (المرهم النخلى), attributed to Galen, but presented here after much modification. He makes it clear at the outset of the text that his material is copied with modifications from the works of Galen, al-Rāzī, Sābūr ibn Sahl, and many other writers.

As ointment bases he uses hog lard, fowl and animal fats,¹⁾ and other substances. Heat of gentle fire is occasionally to be employed, depending upon the nature of the ointment being prepared.

To judge the quality of prepared ointments, al-Zahrāwī relies upon organoleptic methods. For example, he says that a good ointment will give forth the odor of the aromatic ingredients. If it does not, that ointment should be discarded.²⁾

The twenty-fifth treatise presents a facet of particular pharmaceutical interest, although it too has been neglected in past research on *al-Taşrîf*. It merits more historical attention and careful evaluation, a task we undertake in the following chapter.

¹⁾ Wien 211, fols. 1 a-4 b.

²⁾ Wien 211, 14 a-16 b.

CHAPTER SIX

THE TREATISE ON THE "ADHĀN": EXCERPTS AND COMMENTARY

A PRELIMINARY ASSESSMENT OF MANUSCRIPT FILIATION

The twenty-fifth treatise on the "adhān" has been studied from four manuscripts (as microfilm).¹⁾ They are Besir 502 (dated 1496 A.D.), Sehī (dated 1535), Wien 211 (dated 1617), and Besir 503 (dated 1703). These manuscripts are hereafter abbreviated as B₂, S, W, and B₃, respectively. They have been examined to detect any genealogic relationships.

Comparing manuscript B₂ with W we find differences in the number of lines in each page, differences in some technical words and occasionally in word order. These variations make filiation between the two highly unlikely.

However, B₃ agrees with B₂ in the number of lines in each page and the use of vowel points, and word order, where W does not. B₃ differs from B₂ in certain word expressions and in verb and pronoun inconsistencies. The phrases or lines omitted by the scribe who wrote B₂ are retained in both B₃ and W, which were copied much later.

S agrees with B₂ in more respects than any of the rest, but the two are not alike in ways that would suggest that S was copied from B₂. B₂ and S might have been copied from two manuscripts that possibly have a common ancestor, inasmuch as the common error known as "omissio ex homoeoteleuto" is encountered here. As the footnotes show later on, there are phrases overlooked in B₂ that are found in the S manuscript written later.

¹⁾ Despite repeated attempts, we were not able to arrange for the photocopying of the Bankipore manuscript No. 16 until after the present study had long since been completed. This manuscript, too, contains the twenty-fifth treatise. I examined briefly the recently received microfilm. There is nothing of special significance in way of content or variation from the other four manuscripts to alter any part of the reconstructed text, notations, or comments (S.H.).

None of the four manuscripts seems to have been copied from one of the others; and it is doubtful that any two had an immediate common ancestor. The four texts at hand therefore will be assumed independent for purposes of reconstructing the excerpts of the text presented, translated, and commented upon below. The footnotes give variants, reasons for preferring a given reading when not obvious, and explanatory remarks.

APPROACH AND PURPOSE

As al-Zahrāwī launched upon the writing of the twenty-fifth treatise he emphasized its importance as a part of *al-Taṣrīf*. He stated in the preface, in pointing out his approach and purpose, "I set apart this treatise on the 'adhān', their uses, properties, the various ways of manufacturing and the methods of their utilization. Know then that the benefits of the 'adhān' in medical practice as well as in the treatment of diseases are great. The honorable ancients ¹⁾ used them in the treatment of diseases externally by rubbing like a liniment, or internally by drinking."

By "al-adhān", al-Zahrāwī means the fatness or oily essence that could be extracted from certain substances by pharmaceutical processes. Examples of such substances are olives, wheat, sesame, linseed, and even eggs. The extracted fatness, al-Zahrāwī believed, is the vital constituent for medicinal use; and in the singular it is called "duhn", and in the plural, "adhān." In referring to this class of pharmaceutical products, hereafter, these two transliterated words will be used, both for accuracy and convenience.

Al-Zahrāwī divides the text on the "adhān" into two major parts, and goes on to say: "[The first part concerns] the 'adhān' that function through a characteristic power in them without being mixed with other drugs; while the [second] part concerns the action of the 'adhān' with which other drugs are mixed. These drugs in turn could be simple and single or compound and diverse."

Then the author lists several "adhān" that are useful in medicine due to "power inherent" in them, such as [olive] oil, sesame, amygdalin, linseed, peach, radish, walnut, hazelnuts, wheat, henbane

¹⁾ The word (الافاضل) undoubtedly here refers to physicians.

(hyoscyamus), ¹⁾ and the like. Besides, he mentions a number of simples that are to be mixed with the "adhān" for promoting the latter's therapeutic uses, such as rose, violet, jasmine, lily of the valley, clove, cardamom, dill, thyme, and spikenard.

For convenience we have organized our discussion of the "adhān" into three types of information: Pharmaceutical technology, therapeutic uses of the "adhān", and the compounded drugs that blend with them. In each category we present samples of the reconstructed text, an English translation, and comments on various pharmaceutical aspects.

PHARMACEUTICAL TECHNOLOGY

In the pharmaceutical technique employed by al-Zahrāwī we include extraction of the "adhān," the equipment he used, his accuracy in describing the various processes, and his general approach. The samples we choose from the text present a first hand look at the man, his mode of expression, his style and precision, and his way of reasoning. The excerpts are intended to offer a representative picture of the whole text. A look at the list of the "adhān" included shows the wide scope of this treatise. In a manuscript like B3—which is written in a medium sized Arabic script—the text occupies 21 folios (f. 495b. through f. 516b.).

In the list below, the italicized titles signify those "adhān" for which the respective sections are later translated and commented upon: *olive oil* (including "*al-infāq*" and *al-rikābī*" oils), *sesame*, *bitter and sweet almond*, *poppy*, *linseed*, *mezercon* (wild pepper), *castor-oil seed*, *lentisk*, *carthamus*, *radish*, *mustard*, *walnut*, *hazelnut*, *pistachio*, *plum*, *apricot*, *hemp*, *laurel*, *nigella* (*black cummin*), *nettle*, *wheat*, *darnel*, *chick-peas*, *henbane*, *eggs*, *snakes*, *pumpkin*, *melon*, *snake cucumber*, *cucumber*, *ben*, *balm*, *laurus* (bay laurel الرند) or probably (الزبد butter?), *naphtha*, *coaltar*, *red brick*, *flying ants*, *rose*, *violet*, *jasmine*, *eglantine*, *water lily*, *lily of the valley*, *clove*, *narcissus*, *myrtle*, *wild pomegranate blossoms*, *wild camomile* (*daisy*), *bupthalmum* (of the thistle family, Carduaceae), *camomile*, *dill*, *bryony*, *thyme*, *orange*, *rue*, *chicory*, *thorn* (*Tribule terrestris*).

¹⁾ It seems from the discussion in the text (W, f. 23a and B2, f. 395a) that al-Zahrāwī used *Hyoscyamus alba* and not *nigra*.

prickly genista, wormwood, palm spathe, henna flower, *grand basil*, *emblic*, *daphne laureola*, *marjoram* (*wild mint*), sweet basil, *mastic*, *germander*, *basilic clove*, *melissa*, *styrax*, *citron*, quince, *costus*, *apple*, *pyrethrum*, *saponaria*, *colocynth* (*bitter apple*), *squirting cucumber*, *euphorbia*, *oleander*, *lichen*, *eupatory*, *spikenard*, *aloes*, *fenugreek*, *myrobalan*, *purging cassia*, *pepperwort*, *ambergris*, Indian "duhn", a "duhn" prescribed for the heat of the stomach, for moving the bowels, for scabies, for hair removal, for rubbing as a liniment, for consumption, for hair tonic, for coughing (copied from Ibn al-Jazzār), for hair dye, *colocynth* (compounded "duhn"), *camomile* (compounded "duhn" copied from Ibn Māsawayh), and a "duhn" prescribed by Ṭylūn (an ancient physician).

There is one point to be added in regard to the arrangement we have imposed upon the translated part of this treatise. Usually, al-Zahrāwī presents his discussion of each "duhn" by stating its therapeutic usage first and then how it is prepared. Because of our pharmaceutical inclination and for a more logical arrangement, we preferred to reverse the author's order by translating and commenting, first, upon the methods of manufacturing the "adhān" and, second, their medicinal uses.

Let us start with the "foremost and most abundant of the "adhān," according to al-Zahrāwī, the olive oil, "al-zayt" (الزيت).

THE RECONSTRUCTED ARABIC TEXT
OF EXCERPTS FROM THE 25 TH TREATISE

(see page 98 for English translation)

الزيت : - قد يختلف في قوته وطبعه ومنفعته ومضرته من وجوه كثيرة وذلك انه قد يكون حديثا او عتيقا ويكون متوسطا بين ذلك وقد يكون من زيتون قد ملح بالملح ويكون من زيتون قد خالطه الورق ويكون من زيتون قد طُمر في المطامير ويعفن ويكون منه ما استخرج بالما العذب ومنه من زيتون قد يابس في الشمس حتى ^د ذهبت مايته وادخر ^ب ومنه ما استخرج بالمعصار من غير ما ومنه ^ع ما استخرج بالنار وقد يختلف الزيت ايضا ^د من قبل البلدان والارضين فلذلك يلحقه التفاوت في قوته وطبعه ومنفعته ومضرته واما الزيت ^{هـ} الذي يستخرج من زيتون اخضر ^ا غص لم يكمل نضجه فان اليونانيين تسميه زيت الانفاق. كذا زعم دياسقوريدس ان الزيت الانفاق يوناني ونحن نسمى هذا الزيت بزيت الما. الدهن الركابي ^ب - وقد يغسل الزيت على هذه الصفة حتى ينسلخ عنه لونه وتذهب رائحته ويسمى حينئذ الدهن الركابي وانما سمي بذلك لانه ركاب لكل ما يصرف فيه ويحمل عليه وهو ان تاخذ الزيت الحديث الطيب الرائحة اللذيذ الطعم الذي لا يغلب عليه كفيته ظاهره ولاقوه بينه فيوضع في القصارى للشمس ويلقى عليه الما العذب ثم يرفع بالا صدادف ويبدل له الما كل يوم يفعل ذلك دائما حتى يبيض وينسلخ من لونه ثم يترك حتى يطفو الزيت في اعلا الما ويجمع ويرفع هذا اذا كنت في بلد ليس فيه زجاج.

واما غسله بالزجاج فهو أتقن وأهذب بان يستعمل مغسل من زجاج ^ا ببلبلتين الواحدة اضيق من الاخرى الواسعه في اعلاها والضيقه في اسفلها ويكون حملها رطلين او ثلاثه ارطال الواسعه بقدر ما يسدها ابها مك والضيقه ما يدخلها الميل ثم تسكب فيها الزيت والما السخن ثم ضع ابها مك على الفم واصبعك على الثقب وتضربه ضربا جيدا ولا يكون المغسل مملوا نعم ^ب بل يكون مثل ثلثيه ويترك للشمس ساعة حتى يطفو الزيت على الما ويكون في الثقب الذي في اسفله قطنه فاذا طفا الزيت على الما فانزع القطنه واتركه جاريا حتى يذهب الما فلا يزال يفعل كذلك حتى يبيض ويتسلخ من لونه ورائحته.

d) missing W
B₃ وما c)
B₂ missing b)
S missing a)

g) We omitted the word "ṣifah" (صفة)
f) missing S
e) S الزيتون
because the meaning is sufficiently clear without its repetition. It is not always encountered with each "duhn" in the text. h) missing B₃

i) missing B₂

دهن اللوز المر . - وأما استخراج دهنه فهو على هذه الصفة وهو ان تأخذ من اللوز المرطلا^a فتتقيه وتجففه وتذقه دقا جيدا حتى يصير كاللماغ في هاون من خشب قد صب عليه قدر نصف اوقيه من ما مغلى ثم اعركه بيدك عركا جيدا فان انت رايت الدهن قد خرج من بين اصابعك والا فتزيد الما المغلى قليلا حتى ترى الدهن خارجا واياك ان تزيد من الما فوق القدر فيصير اللوز شبيها يا للبن ويفسد ولا يخرج الدهن ثم اعصره بيدك في غصاره نظيفه فاذا بدا يخرج الدهن من بين اصابعك اجعه برفق وارفعه ثم صب على عصارته^b الباقيه ما مغلى ايضا قليلا ثم دعه حتى يشربه افعل به كما فعلت اولا حتى يخرج الدهن اجمع ومقدار الدهن الذي يخرج منه الربع وان استقصى خرج منه الثلث وايضا على قدر دهنية اللوز فقد يتفاضل اللوز على حسب البلدان وقدم اللوز وطراوته .

دهن الغار . - صناعة دهنه معروفه واكثر ما يجلب الينا هذا الدهن من الغرب نحو سبت^c وهناك يصنع لكثرة وجود شجره وذلك ان يؤخذ حب الغار بعد تناهى نضجه فيدق حبه ويجعل في قدر ويصب عليه من الما اكثر من غمره بكثير ثم يطبخ حتى يظهر دهنه على الما ثم يجمع الدهن برفق ويكون طبعه بنار لينه وقد يتخذ على غير هذه الصفة وهو ان يؤخذ من الزيت الركابي خمسة أقساط ومن حب الغار رطل فيدق ويطبخ بالزيت نعما ويعصر ويستخرج ويرفع .

دهن القمح . - صفة استخراج دهنه على هذه الصفة وهو ان تجعل حنطه نقيه في بطن زجاج قد طين بطين الحكه ويلقم فم الزجاجه بليف قد صنع من خيوط الصفر الدقاق لتقوم في حلق الزجاجه ويمنع الحنطه ان تخرج من الزجاجه اذا اكبت ويتخذ كاتون ويشقب من وسطه وتكبس^d فيه الزجاجه وتخرج راسها الى اسفل ويوضع يازا قم الزجاجه شي^e يقطر فيه ما يسيل من الحنطه ويلقى حول الزجاجه بسرقين يا بس ويشعل فيه النار فان الدهن يقطر ويرفع ويستعمل على ما وصفنا فانه عجيب .

وقد يصنع على غير هذه الصفة وهو ان يؤخذ القمح ويوضع على رخامه ويحمى صفيحه حديد غليظه وتوضع على القمح فان الدهن يخرج فيجمع برفق وهذا الضرب من استخراجه قد اعتاد الحدادون عندنا استخراجا .

بحوسيته^c B₃ رطلان^a B₂, S
B₃ يلبس^d e) missing S
b) missing W to the end of the paragraph.

دهن الخروج^a. - استخراج دهنه على هذه الصفة يؤخذ حب الخروج المستحکم في شجره فيشمس فاذا انشق من قشره وتساقط فاجمع ما في داخله وصيره في هاون ودقه دقا ناعما ثم امرحه في قدر اتيكه^b وصب عليه الماء ثم اغله فاذا خرج دهنه كله ازلت القدر عن النار وجمعت الدهن كله بصوفه ورفعته الى وقت الحاجة. وقد يستخرج على حسب ما يستخرج دهن اللوز الا انه يحتاج الى حذق ولطف لانه مسترخی الجسد^c.

دهن الخردل. - صفة استخراج دهنه هو ان يؤخذ فيدق دقا ناعما ثم ينقع في ماء حار ويخلط به شيء من زيت ويعصر في منديل صفيق ويرفع.

دهن الفجل. - صناعة استخراج دهنه معروفه يستخرجه الدهانون كثيرا بمصر ولكنهم يوقدونه في المصابيح بدلا من الزيت.

دهن الشونيز. - صناعة دهنه على هذه الصفة يؤخذ من الشونيز رطلان^d فيوضع على طابق ويقل^e حتى ينتفخ^f ثم تتركه حتى يبرد ثم تسحقه حتى يعود كاللخ ثم تاخذ من ماء قد انقع فيه حلبه يوما وليله بعد ان تصفيه عن الحلبه وتجعله في قدر وتسخنه فاذا سخن فاجعل الشونيز عليه ثم اغله عليه او غليتين ثم ازله عن النار والقط الدهن يكفك برفق وصيره في قاروره وارفعه لوقت الحاجة.

دهن الحمص. - يؤخذ الحمص فيطحن جريشا ويؤخذ قدر فيجعل فيها الحمص ويربط فيها بخرقه ويؤخذ قدر اخرى فارغه يكون فيها اوسع من القدر التي فيها الحمص ثم تكب^g على القدر الذي فيه الحمص ليقع فيه داخل ثم القدر الفارغ ويطين جميعها وتحفر حفرة تدخل الفارغه فيها وتبقى الملا بالحمص خارجا ويحمل عليها نارا ليته حتى يبرق الحمص ويخرج دهنه ويسيل في القدر الفارغه ان شا الله تعالى.

دهن البيض. - استخراج دهنه على هذه الصفة وهوان تاخذ من البيض عشرة بيضات وتسلق ثم تقشر وتجعل في مغرفة حديد وتوضع المغرفة على نار حمر حتى يحترق البيض ويخرج منه دهنه ويصير المخ^h فحمه ويرفع في زجاجه وقد يستخرج ايضا على هذه الصفة على

a) The whole paragraph on mustard is missing W, only the title is inserted in margin fol. 25 b. b) الىه B₂ not clear c) الجوهر B₂, S d) missing B₂ e) ويقل B₂ f) ينتفخ W g) the phrase is repeated S h) المخ B₂, and the same was repeated two times more in this passage on preparing دهن البيض

ما أصبته في بعض النسخ وذكر فيه أنه ينفع من جميع أوجاع الجسد كلها وكل وجع لا يعرف ماهو وهو علاج مجرب يعين على الحبل ويصلح الأرحام للولد . يؤخذ البيض ويطبخ كما هو ثم يستخرج الملح ^a الأصفر منه إذا طبخ ثم تمرته وتصفيره في خرقه بيضا نقيه لا يخالطه شئ سواه ^b ثم تجعل قدرا جديده منصفه بما عذب فإذا سخن علققت الملح المربوط في الخرقه على الما في عود معترض على فم القدر من غير أن تمس الخرقه الما فإذا نالتها حراره الما لانت فتخرجها وتمسها برفق وتعصرها فإنه ينعصر ويخرج زيتة فتجمعه في انا زجاج وترفعه فهو مجرب .

دهن البلسان . - اما استخراج دهنه فهو ان يشرط قضبان البلسان بمشراط فيسيل منه الدهن ويجمع . وذكر بعض الحكماء انه يوجد بعد طلوع كلب الجبار وهذا البلسان الذي منه هذا الدهن انما مثبتة خاصه بارض مصر في موضع من اعمالها يسمى عين شمس . النفط . - صنفان صناعي ومخلوق فالمخلوق منه يخرج من عيون اسود متين الرائحه ثم يصعد فيبيض واما الصناعي فيصعد من ادهان وهما جميعا مستعملان وهما حاران في الدرجة الرابعه فيهما قوه جاذبه للنار .

دهن الحيات . - صفه استخراج دهنه هو ان يؤخذ من دهن السيرج ثلاثه اقسام فتصير في فخاره ويلقى عليها من الحيات السود ما بين خمسة الى عشره على قدر ما تكون الحيات من الكبر والصغر ويسد راس الفخاره ويطبخ بنار لينه ويترى عن النار ويترك حتى يبرد قليلا ويفتح راسها ويحذر من بخارها ويترك حتى يبرد ويذهب عنها البخار وتصفى وتصير في إناء وتستعمل فيما وصفنا بان يطل بريشه فان رأى انه يؤذيه امسك عنه ثم عاوده حتى يبرا ان شا الله تعالى .

وقد يستخرج ^c من دهنه على غير هذه الصفه وهو ان يلقي في الما المغلى ويطبخ حتى يتهرا ثم يلقط الدهن من على الما ثم يرفع فإذا احتيج اليه خلط الدهن بشئ من سيرج ويستعمل فهو اقوى في ذلك ان شا الله تعالى .

دهن النمل الطيار . - يؤخذ من النمل الطيار الف نمله وتنقع في رطل من دهن الزنبق ويلقى في الشمس الحاره اسبوعين ويدهن به .

a) Partially defective from سواه to the end of the passage b) دهن النفط W
c) From وقد يستخرج to the end of the passage, including the second method of preparing the "duhn" missing B₂

دهن البنج . - وصنعة استخراج دهنه على هذه الصفة ^a وهو ان يؤخذ من بزر البنج الابيض اليابس الحديث فيدق ويعجن بما حار ثم يشمس فما جف منه خلط بالياق ولا يزال يفعل به ذلك حتى يسود ويلين ثم يعصر بمنديل صوف صفق ثم يجمع الدهن برفق وتضع في انا ويرفع ^b .

الادمان المركبة من الادوية المفردة

دهن الورد . - دهن الورد ضروري وصناعاته كثيرة ومنافعه ايضا مختلفة لان منها قديمة ومنها محدثة والصناعة القديمة التي ذكرها جالينوس والقديما من الحكماء ثلاثة ضروري احدها ان تاخذ من زيت الزيتون المعروف بزيت الانفاق او الزيت المغسول المعروف بالركابي رطلا فتضعه في ظرف مزجج الداخل والخارج ثم تلقى على الرطل اربعة من الورد الغض ويسد ^c راس الظرف وتعلقه في الشمس اربعين يوما فاذا تم له ذلك صفى ورفع في الزجاج فهذه الصناعة افضل صناعاته والطف جوهرا واغوص في الاجسام .

واما الصناعة الثانية فهو ان تاخذ هذا المقدار بعينه من الزيت والورد ثم تعلقه في البير حيث لا يمس الما وتتركه فيه شهرين ثم تخرجه وتصفيه وترفعه فهذه الصناعة تبقى فيها رائحة الورد جدا ولكن في جوهه دهنه غلط بطي السلوك في الاجسام ليس معه من اللطافة والغوص ما الاول .

واما الصناعة الثالثة فهي ان تاخذ هذا المقدار بعينه الا ان الانا الذي تضعه فيه تغليه من داخل بالعسل وبعد ذلك تضع فيه الزيت والورد وتسد ^d راس الانا نعما وتدفعه في قعر الارض وتضع التراب عليه ولا يكون في مكان يمس فيه الما او نداهه قويه فتتركه شهرين .

واما صناعة دهن الورد التي استنبطها اهل العراق فعلى هذه الصفة يؤخذ السمسم كما هو غير مقشور فيبسط للظل في ملحفه ويجعل منه طاقة وطاقة ورد ثم يترك يوما وليلة ثم ينزع عنه الورد ثم يعاد اليه ورد آخر يفعل ذلك به مرات حتى ياخذ السمسم قوه الورد ثم ينزل ^e عنه ويطحن في الطاحون ويعتصر ويرفع دهنه واجوده ما اعيد عليه الورد اكثر من ثلاث مرات فما كان دون ذلك ففعله ومنفعته وقوته بحسبه .

^a) missing B₂ ^b) B₂ باذن الله added S, B₃ ان شا الله ^c) B₂ ويشد
^d) B₂, B₃, W وتشد ^e) S يغربل

واما الدهن الذى يأتينا من المشرق كله فهو دهن عامى ليس فيه من قوة الورد الا اليسير وقوة الصبرج عليه اغلب لان الورد لا يعاد عليه الا مرة او مرتين ومع هذا ايضا ان منه راسا وثانينا وثالثا فالذى يخرج من تحت المعصار فى اول عصره يخرج رقيقا ذكى الرائحة ثم يستخرج بعده ^a دون الراس وثالث دونهما ، لان فيه غلظ وهو اقرب الى ان يكون سيرجا من ان يكون دهنا لان قوة الورد فيه ضعيفه وهذا الثالث من الدهن يسمى الرجلين ^b هو الذى يخرج الى البلدان ويفترق فى الامصار وقد كان يصنع عندنا بقرطبه دهنا مكررا عليه الورد عجيب لا يقوّه شى .

وهذه الصناعة من الدهن صناعه لطيفه جدا لان السهم يقبل كيفية الورد ولا يقبل من جسمه شى قبلك لطف وصار اغوص فى الابدان واسرع نفوذا من ساير صناعاته كلها فن اراد ان يحود صناعته فليعد عليه الورد خمس مرات الى سبع مرات ثم تاخذ منه الراس الذى يخرج اولا فتستعمله .

دهن الآس . - اما صناعته فعلى ضربين لان منه ما يعمل من ورقه الغص ومثله ما يعمل من ثواره وهو زهره وذلك ان يؤخذ منه ثلاث ^c اواق ويلقى عليها رطل من الدهن الركابى ويلقى فى الشمس اربعين يوما ثم يصفى ويرفع منه ما يربب بالسهم على ما وصفتا فى الورد والبنفسج ثم يعتصر ويرفع وهذه الصناعة افضل صناعاته واخص بان يدخل فى الطيوب ويصلح للملوك واهل الرفاهيه .

ومنه ما يصنع من ورقه وهو على ثلاثة انواع وهوان يؤخذ ورق الآس الطرى فيدق ويعصر ويخلط بعصارته مثلها من زيت الانفاق ويطبخ حتى تذهب العصاره ويبقى الدهن . ومنها ان ^d يطبخ ورق الآس المدقوق فى الما او فى الشراب وهو الاصل طبخا جيدا حتى يقبل الما قوته ويصفى ويلقى على ذلك الما مثله زيت الانفاق او دهن خل ويطبخ حتى يذهب الما مثل الاول ويصفى فى انا زجاج . ومنها ان يؤخذ ورق الآس الغض فينقع فى زيت الانفاق ويوضع فى الشمس اربعين يوما حتى يقبل الدهن قوة الآس .

^a) added B₃; omitted here as being a distorted repetition
^b) الرجلين B₂, S ^c) written ثَلَاث ^d) وما W

دهن البابونج . - اما صناعة دهنه فهو ان يؤخذ فقاحه ^a فيلقى على الدهن الركابي ويلقى في الشمس اربعين يوما ثم يصفى ويرفع . وان شئت صنعته بالتربيه بالسسم واستخراج دهنه وقد يصنع ايضا على هذه الصفة وهو ان يؤخذ روس البابونج الاخضر الرطب فيدق ويعصر وتؤخذ عصارته ويجعل عليها من دهن السيرج ما يكون مثلها ثم يحمل على النار ويطبخ حتى تذهب العصاره يفعل ذلك مرات فكلما اعيد عليه العصاره اتى الدهن اقوى واعطر وانفع .

دهن الانسين . - اما صناعة دهنه فهي ان يؤخذ من فقاحه ^a عند تناهي طيبه وهو اخضر رطل ^b ويلقى عليه اربعة ارطال من الزيت الركابي او غيره من الزيت ويلقى في الشمس اربعين يوما ثم يصفى ويستعمل . وان شئت ربيته بالسسم على ما تقدم ذكره في سائر الادهان .

دهن الخضرا . - هذا دهن يقوم من قشور الخضرا وهو يقوم مقام دهن الورد في منافعه واما صناعة دهنه فهو ان يؤخذ من قشور الخضرا جز فيدق دقانا عما ويلقى عليه من زيت الانفاق او الزيت الركابي مثل وزنه وينقع فيه ثلثه ايام او اربعة ويعصر ويرفع وان شئت علقتة للشمس كما تقدم في سائر الادهان وان شئت حملته على النار فهو اسرع الا ان الشمس انفع .

دهن المازريون . - اما صناعة دهنه فهو ان يؤخذ من المازريون الاخضر رطل ويصب عليه خمسة ارطال ما يغلي ^c حتى يبقى رطلان ويصفى ويصب عليه من دهن اللوز الحلو ثلاث اواق ويطبخ حتى يفنى الما ويرفع ^d ويستعمل عند الحاجة ^e .

دهن البادروج . - اما صناعة عمله ^f فهو ان يؤخذ من الدهن الركابي رطلان ويلقى عليه من البادروج بعد دقه رطل ويلقى للشمس او يلقي على العصاره ^g الما ويطبخ نعا ثم يصفى ويلقى على الصفو من الدهن الركابي ويطبخ حتى يذهب الما ويبقى الدهن ثم يصفى ويرفع .

دهن الاملج . - اما صناعته فعلى ضربين احدهما وهو ان يؤخذ من الاملج رطل ويلقى عليه من الما ستة ارطال ويطبخ حتى يذهب الاربعة ارطال ^h ويبقى الرطلان ثم يصفى

a) فقاحه B₃ b) رطب ? B₃ c) missing B₂, B₃, S d) missing W
e) added B₂ فانه غايه f) دهنه عمله S g) العصاره S h) missing W

ويلقى عليه من الدهن الركابي أو زيت الانفاق^a رطلان ويطبخ حتى يذهب الماء ويبقى الدهن ثم يصفى ويرفع .

وإن شئت فذقه وأثقله في الزيت وعلقه للشمس حتى ياخذ الزيت قوه الدوا ثم تصفيه وترفعه .
دهن المصطكي . - أما صناعة دهنه فهو أن يؤخذ من المصطكي أوقيه فيسحق ويطرح عليه من الدهن الركابي رطل ويحمل على نار فحم ويحرك دائما حتى ينحل المصطكي ويقل الدهن قوته ثم ينزل ويصفى .

وإن أردت أن يلقى أقوى^b وأعطر نقت في الدهن من الادخر وقصب الذريره من كل واحد نصف أوقيه ثم يترك فيه ايا ما سعلقا للشمس ثم يصفى ويرفع الى وقت الحاجة إن شا الله تعالى^c .

دهن الباذرنجويه . - أما صناعته فهو أن يؤخذ من الدهن الركابي رطل ويلقى عليه من الباذرنجويه الغض ربع رطل ويد راس الانا ويلقى في البير اربعين يوما ثم يصفى ويرفع وإن شئت علقته للشمس ولكن المعلق في البير أقوى رايحه وأعطر . والشمس الطف وإن بدلت له الباذرنجويه كل اسبوع كان انفع وأقوى فعلا .

دهن الميعه . - أما صناعة دهنه فهي أن يؤخذ من دهن السرج رطلان ومن الميعه اليابسه اربعه اواق يطبخ في انا مضاعف حتى يقل الدهن^d قوه الميعه ورايحتهما وينزل ويصفى ويرفع ويستعمل وإن شئت علقته للشمس على ما وصفنا .

دهن الاترج . - أما صناعة دهنه فعلى ضروب وهو أن تاخذ قطنه فتغمس في السرج ثم يوتى الى الاترجه النابتة في شجرتها فيطلى بها اربعين يوما ثم تقطف ثم تجر عليها ملقه فضه رقيقه ويستخرج الدهن شيا فشى ثم يرفع .

وقد يصنع على هذه الصفه وهو أن يؤخذ الاترج الصغير الطيب الصغرى فيطرح عليه السمسم حتى يغطى به الاترج ويترك حتى ياخذ السمسم قوه الاترج ثم يبدل له اترجا تفعل ذلك على قدر ما تريد من قوه الدهن ثم يعصر السمسم ويستخرج دهنه ويرفع .

وإن شئت قشرت الاترج واخذت قشره وربته بالسمسم ثم استخرجته ورفعه .
ويصنع ايضا بان يؤخذ الاترج اذا بلغ^e واستحكم فيبيت ليله ثم تاخذ محاره^f ليله

a) written in the margin only S
missing W

d) blurred S

b) repeated أقوى B₂

e) blurred S

c) ن شا الله تعالى B₂

f) فخاره B₃

الحرف او مدهن فضه لين الحرف فتجرد الآترجه جردا اطقفا لا يخذشها فيخرج معها شى من جرمها فاذا اجتمع ما يحتاج اليه جعل في قدح قد بخر بشى من عنبره^a طيب مرتين او ثلاثه بعد ان يبدل الدهن في انيه اخرى وكلما كثرت التبخير كان الدهن اعطر واقوى لنفع الدماغ ثم اجعله في زجاجه ضيقه القم وسد راسها بشمع وارفعه فهذا الدهن من الادهان الجليله القدر يدخل مداخل الطيوب التى تصلح ان يستعملها الملوك واهل الرفاهيه.

دهن التفاح . - اما صناعة دهنه فهى كصناعة دهن الآترج من ان يربب التفاح الحلو^b كما هو غضا بالسسم ثم يعصر السسم ويستعمل او يوخد قشره غضا فينقع في الدهن الركابى ويلقى للشمس حتى ياخذ الدهن قوه التفاح ثم يستعمل ان شا الله تعالى.

دهن الحنظل الساذج . - اما صناعة دهنه فانه يوخد رمان الحنظل وينقره^c ويخرج حبه فقط ويترك^d فيه شحمه ثم يملأ زيتا ويلقى للشمس شهرا ثم يصفى الدهن ويرفع او توضع كاهى ملوه بالزيت على رصف^e نار حتى يسخن الزيت وتصفيه وترفعه هذا اذا اردت به الاستعمال . وصفه اخرى يوخد من عصاره الحنظل الاخضر بعد تناهى نضجه قدر اربعة ارطال ثم يلقي عليه من الدهن رطل ثم يحمل على النار ويطبخ حتى تذهب العصارة ويبقى الدهن ثم يصفى ويرفع وان لم تجد الحنظل اخذت الياض وربيت بحبه وقشره واخذت من شحمه ربع رطل والقيتيه على رطل زيت وطبخته حتى تخرج قوه الحنظل ثم يرفع ويستعمل .

دهن قثا الحمار . - اما صناعة دهنه فيصنع على وجوه احدها ان يوخد فيدق وتوخد عصارته ثم يضاف اليها مثلها زيت ثم تطبخ حتى تذهب العصارة ويبقى الدهن . ومنه ان يوخد قثا الحمار فيقطع وهو اخضر ثم ينقع في الزيت قدر ما يغمره مرتين ويسد راس الانا ويلقى للشمس اربعين يوما او نحو ذلك ثم يصفى ويرفع .

ومنه ان يطبخ في الما اولا ولا سيما ان كان يابساً ثم يصفى عن الما ويلقى على الزيت ويطبخ حتى يذهب الما ويبقى الدهن^f ثم يصفى ويرفع الى وقت الحاجة .

دهن الدفلى . - النافع من الجرب الرطب يذهب به اصيلا مجرب . يوخد من عصاره الدفلى قدر رطل ثم يلقي عليه نصف رطل زيت الورد او زيت الانفاق ويطبخ ذلك حتى

^a) عطر B₂ and in the margin عنبره by a different handwriting
^b) missing S
^c) يقشر B₀ ^d) وينزل W ^e) وصف or وصيف ^f) الزيت W

يذهب المصاره ويبقى الدهن ويصفى ويرفع . وقد يلتقى في موضع الدهن شمع او شمع والدهن احسن ثم يدهن به ويقيم يوما وليلة ثم يدخل الحمام يفعل كذلك حتى يذهب الجرب وهذا الدهن يقتل الصبيان في البدن ^a حيث ما كانت .

(for English rendering, see pages 114 ff.)

الزيت . - لم اقصد الى ذكر الزيت هاهنا في هذه المقالة على طريق الغذاء وانما قصدت ذكره على سبيل الدوا لاني قد ذكرته في كتابي في الاغذية باوسع قول فنقول ان افضل انواع الزيت ما كانت رائحته عطرية وطعمه لذيد سليم من اللدع والحرافه ويكون قبضه ظاهرا فا كان كذلك كان اميل الى البروده واليبوسة وهذا الصنف يصلح في علاج الاعضا الضعيفة ويدخل في المراهم التي تحتاج الى القبض وتقويه الاعضا وهو اوفق لصناعة دهن الورد من غيره وما كان من الزيت مستحزجا من زيتون اسود قد استحكم فضجه فانه يرطب ^b ويسخن استحانا معتدلا ويرخي الاعضا ويبسطها ويمدها ويذهب بالاعيا اذا دهن به ومرخ من خارج ^c ولدياسقوريدس قول في الزيت قال ان جميع انواع الزيت مسخنه ملينه للبشره وباسطه للاعضا مانعه للعرق من الخروج من مسام البدن اذامح الجلد بها مانعه للبرد من الوصول الى الابدان بسرعه مضغه لقوة الادويه القائله ^d يلزوجتها معينه لتلين البطن وانما ذكر هذا ^e ديوسقوريدس على الجملة وعند النظر يحتاج الى التفصيل والتحديد من طريق ما وصفنا من اختلاف انواع الزيت ولكن يطول به الكتاب ويخرج عن الغرض الذي قصدنا له .

واذا شرب من الزيت تسع اواق مع مثله من ما الشير وما حار اسهل البطن واذا طبخ بشراب وشرب منه تسع اواق وهو حار نفع من المنص العارض من الفضول الغليظه واخراج الدود وحب القرع من البطن واذا احتقن به نفع من القولنج العارض من ورم المعاء ومن السده المتولده من الرجيع اليابس واذا اكتحل بالزيت العتيق احد البصر ^f .

دهن اللوز المر . - النافع لاجاع الارحام وانقلابها واورامها الحاره والعله التي تعرض من اختناق ارحام النساء والصداع والوجع الاذن ودويها وطنينها ويقتل الدود المتولد فيها مفتح لسدد الكبد والطحال نافع للربو ولوجع الكلى وعسر البول واذا خلط بعمل واصل

a) missing W b) رطب B₃ c) يمرخ B₂ d) القابله B₂, B₃ e) بهذا B₁
f) added B₂, B₃, S. ان شا الله تعالى

السوس^a وشمع ودهن الحنا ودهن الورد وحمل على الصدر من خارج نفع من الربو وكذلك اذا حل على صاحب الجشاء^b وورم الطحال من خارج نفع ايضا ويقطع الانار التي تكون في الوجه من فضول البدن وينفع الكلف ويبسط تشنج الوجه وينفع من تكدر البصر وكلاله اذا اكتحل به واذا خلط بخمر وطلى به الراس نفع من القروح الرطبة والابريه التي تكون فيه .

دهن اللوز الحلو^c . - دهن اللوز الحلو لين في وسط الدرجة الاولى صالح للكبد مفتوح للسدد نافع للصدر والريه ملين مرطب يخشو نفعها نافع من حرقه البول يحلل الاورام الصلبه ويبسط التشنج في اى موضع كان .

دهن الفار^d . - قوته مسخنة ملينه مفتحة لافواه المروق ومحلله للاعضاء وتوافق لكل وجع من اوجاع الاعضاء والاقشمرار واوجاع الاذن والنزلات والصداع واذا شرب غنى صاحبه واضربه وانما خاصته نفعه للايدان الباردة وينفع من الحكه والجرب المتقدم ومن صلابه الجلد والقوبا العارض من البلغم المالح اذا دهن به في الحمام ويقتل الديدان اينما كانت في الجسد والقمل والصبيان ويفسل الابريه وينفع من داء الثعلب وداء الحية وينبغي ان يدهن به اول ساعه من النهار ثم يستحم العليل في الساعه الخامسة بعد ان يغسل راسه بعمل^e ودقيق الحلبه وليحذر المتعالج بهذا الدهن من كان مزاج راسه او جلة بدنه حارا . واجود ما يكون من دهن الفار ما كان حديثا اخضر شديد المراره حريفا في مذاقه واذا شرب منه وزن درهم مع اوقيتين شراب جلاب لانه دهن فيه حده ويسهل بقره وهو يضر بالاعضاء الباطنه وينفع من الما الاصفر .

دهن القمح^f . - وهو حار نافع من القوبا المتبديه وذلك ان تحك القوبا بخرقه خشه حتى تهم ان تدمى ثم يحمل عليها الدهن يفعل ذلك بها حتى تبرأ ان شا الله تعالى .

دهن البنج^g . - بارد مخدر للحواس نافع من السهر اذا قطر منه في الانف ويسكن الصداع الصفراوي .

وينفع من قروح الراس اذا كانت من المره الصفرا ومن الحكه والجرب ويقع في

a) السوس B₂, S b) الجشاء B₂, B₃, S c) The whole paragraph is missing W
d) يغسل (lotion) B₃ and S, which is possible also.

الفرزجات فيمكن اوجاع الارحام وقد يدهن به مواضع الصبيان في اوجاع البدن فيقتلها ^a ويدهن به الصديق فيجلب نوما معتدلا وقد ينفع من وجع الاذن اذا قطر فيها .

دهن الخروج . - نافع من الجرب والقروح الرطبة التي تكون في الراس والاورام التي تكون في المقعدة ولانضمام فم الرحم وانقلابه والاثار السمحة العارضة من اندمال القروح ولوجع الاذن وينزل الحيضة منقى للعصب من اللزوجات المرتبكة واذا شرب اسهل البطن واخرج الدود الذي يكون في البطن واذا طلى على دا الشعلب نفعه .

دهن الخردل . - هو حار لطيف يصلح للاوجاع الباردة المزمنة ويخفف ^b الرطوبة وينقيها وينفع من دا الشعلب ومن اوجاع المفاصل ومن الفالج ^c والرعشة والاختلاج واللقوة والناقض وينفع من لسعة العقرب وجميع الهوام الالذغة الاغنى واذا دهن به موخر الراس بعد حلقه بالموسى نفع من النسيان وقوى الحفظ وحلل البلغم الذي هو سبب ذلك ويخفف العصب .

دهن البيض . - نافع من اوجاع المقعدة ومن الضربان فيها ولوجع الاذن والضررس .
دهن المازريون . - حار مسهل للما الاصفر يشرب منه وزن درهمين بلبن اللقاح فيسهل الما الاصفر في علة الاستسقا .

دهن الاملج . - دهن الاملج بارد قابض وخاصته تقويه المعدة والمقعدة والنفع من البواسير واذا دهن به الشعر منعه من التساقط وقوى اصوله وسوده .

دهن الورد . - قبل ان نبدا بذكر اصناف صناعاته فلنذكر ها هنا منافع جملة ثم ناتي بوصف صناعاته واخذ ايضا في ذكر منافع كل صنف على التفصيل والتحديد ليكون ذلك ابين ووصفنا له ابلغ فنقول ان دهن الورد من الادهان المقدمة العجيبة ومنافعه كثيرة جليلة وهو بارد قابض في اعتدال ليس برده ظاهرا ولا قبضه بينا ولا اطلاقه للطبيعة مفرطا ولا امساكه ايضا قويا يطلق الطبيعة اذا شرب منه مقدار ازيد ويتقبض الطبيعة اذا شرب منه مقدارا معتدلا ولا سيما اذا شرب ببعض الاشيا الملية ان اريد ^d اطلاق الطبيعة وان شرب ببعض الاشيا الماسكة امسك ^e الطبيعة وهو مسكن لجميع الاوجاع التي

ان اريد ^d From ^a B₉, W فيقتلها ^b يخفف B₂, B₃ ^c blurred S ^e missing S.
to in margin B₃ الاشيا الماسكة

تكون من الحروان شرب^a نفع من حراره المعده والتها يها وان دهن به من خارج فعل مثل ذلك وكذلك ان قطرته على بعض الاشربه النافعه للكبد الملتهبه والمعدة والاحشا نفعها وان شرب منه مع^b البزود قطونا المفصوله المحصه على النار نفع من اطلاق الطيبعه التي يكون سببها ادويه حاده سهله^c ونفع من سحج الامعا وكذلك اذا شرب مع لبن النعاج نفع من حرته السبول وحرته المشانه رشده^d وجعها ونفع من قروح الكليتين وحرهما^e والتها يها ومن غل ديا يبطس^f وهي العله التي يشرب صاحبها الما الكثير ويبوله سريعا وكذلك يفعل اذا دهن به من خارج واذا مزج مع خل وسكب على الراس سكن الصداع العارض من وريح الشمس والسوم ومن حراره الحمى والبرسام وان ضرب بالخل وحمل على البدن نفع من الثرى والحكه والجرب ولا ينبغي ان يفعل ذلك الا بعد تنقيه البدن وكذلك يفعل اذا سكب على الراس الذي فيه الوجع من قبل ضربه وشقه العظم وظهر صفاق الدمغ وصب عليه دهن الورد مذا كان عوضا من دم الشفائين والحمام نفع ذلك وسكن الوجع وتقع الورم الحار فيها ومن الوجع الكاين مع ريح حاره واذا شرب مع حسو الشعير نفع من ابتدا السل وقرحة الريه ونفع من السل الذي يكون من قبل انحلال الاعضاء الرئيسيه واذا احتقن به نفع من سحج الامعا وسكن الوجع واذا قطر في الاحليل يبعث الشياقات او يلين النساء نفع من الحرقه والسليخ الذي يكون في القضيبي واذا مرخ به اليدين من خارج نفع من العرق المفرط واذا غمر به الجراحات العتيقه انبت اللحم فيها واذا صنع منه مرهم مع بياض^g البيضه المسلوقه^h وحمل على العين الشديده الحر والوجع سكنها واذا صنع منه قيروطىⁱ بشمع ابيض وحمل على شقاق اليدين والرجلين نفعهما ومن شقاق الشفتين وقروح المنخرين واذا حمل في قطنه على السن الذي قلع سكن وجعه واذا تمضمض به مع لسان الحمل نفع من قروح الفم والقلاع وينفع من جميع القروح التي تكون من المره الصفرا والدم الحاد مثل النمله^j والحمرة وحرق النار اذا حمل عليها وحده او مع شمع ابيض وقد يدخل دهن الورد في كثير من الاقراص التي تنفع من نزف الدم والمراهم وقد تلت به

a) from شرب to مثل ذلك missing S b) missing B₂ c) missing B₂
d) وسد B₃, S, W e) وحفرهما W f) ديا نيطا B₂, B₃ g) فص B₂, B₃
h) in margin only B₃ i) طرقيروطى B₃ j) Missing B₂.

الادوية القوية الحده المشروبه ومذا فعه كثيره والمتطلب قد يقيس بالقليل على الكثير وبالظاهر على الباطن وبالحاضر على الغايب ويجرى الامور على مراتبها وحقا يقها بحسن الخدس والنظر فقد ذكرنا من منافع الورد ما فيه كفايه .

دهن المرزنجوش . - هونافع من الاعيا اذا دهن به في الشمس او في الحمام وينفع من الفالج واللقوه اذا سعط به او صنع في الضمادات وان قطر في الانف اخرج الرياح ونفع من الامراض الباردة وان قطر في الاذن سكن الدوى والطنين وحلل الرياح التي فيها ولا سيما ان رطب باللوز وقد يدر الطمث وينفع من لسعة العقرب واجوده ما كانت فيه راحة المرزنجوش قويه .

دهن الحنظل الساذج . - نافع من الامراض الباردة واذا شرب اسهل بلغما وخاما كثيرا واخرج الحيات وحب القرع من البطن واذا حمل على السره معقودا يمراره البقر فعل مثل ذلك واذا احتقن به نفع من القولنج الذي يكون سببه فضول غليظه واذا دهن به الرأس نفع من الابريه ومنع الشعر من التساقط واذا قطر منه في الاذن نفع من الدوى والطنين وقتل الدود المتولد فيها واذا جعل منه على صوفه وحمل على السن الوجعه وهو سخن جدا ازال الوجع واذا دهن به مواضع الاوجاع الباردة حيثما كانت ازالها .

(corresponds with English rendering, pages 121 ff.)

دهن المرزنجوش . - النافع من انضمام فم الرحم وانقلا به ومن الاورام العارضه فيه من البرد والاورام والاختناق^a العارض فيه الذي يعرض منه الغث^b ويدر الطمث ويخرج المشيمه وينفع من وجع الظهر وعرق النسا ويحلب العرق ويحل الاعيا .

يؤخذ من ورق الاس والسليخه والمرزنجوش والقيصوم من كل واحد اوقيه ومن الزيت اربعة^c تدق الادويه وتنقع في الزيت عشره ايام الى عشرين يوما ويصفى ويرفع .

دهن لحر المعده . - الذي اضعف قواها وولد فيها القى والحرقه والالتهاب وقد تعرفنا بنجحه .

يؤخذ من ما الحصرم وما الرمان المر وما الاس الغض وما الورد الجورى وما العوسج الغض من كل واحد ثلث رطل فتجعل جميعها على نار ليه مع دهن الورد ودهن البنفسج

a) والصلابه W

b) W, B₂; and S, and either could be possible

c) defective S.

ودهن اللوز الحلو من كل واحد ثلث رطل^{a)} ويلقى عليه مثقالان صندل ومثقال رامل
ويطبخ حتى يذهب الماء ويبقى الدهن وعند ذلك يصفى في النيم ويعتق بدانقين كافور
ويرفع ويسقى^{b)} منه مثقال الى مثقالين ويمرغ به البدن من خارج .

صفه دهن يطلق الطبيعه . - وينفع من القولنج مجرب يؤخذ نوار بنفسج وحب سقرجل
وحب القرطم وبزر الكتان من كل واحد عشرة دراهم وزبيب منزوع العجم زنه عشرين
درهما ومخيط منزوع الاقماص عشرون حبه خيار شبر وترنجبين من كل واحد عشرة دراهم
يجمع ويطبخ في اربعة ارطال ما بنارائه حتى يبقى رطل ويمرس ويصفى ثم يلتقى على
ذلك الصفو نصف رطل دهن لوز حلو ونصف رطل دهن سمسم ويطبخ حتى يذهب
الماء ويبقى الدهن فعند ذلك ينزل عن النار ويرفع منه اوقيتين بما حار فانه عجيب فيما
وصفناه^{c)} .

دهن الفتة للجرب . - الذي لا يعمل فيه دوا يقلع جميع اصناف الجرب^{d)} يؤخذ من
عصارة الدفلى الرطب رطل او من طبيخها اذا لم يقدر على عصارتها والعصاره اقوى ومن
ما الكرفس الرطب نصف رطل ومن الميعه السايهه نصف رطل ومن الشمع الاصفر^{e)} ربع^{f)}
رطل ومن زيت الورد نصف رطل وان لم يتمكن^{g)} من زيت الورد فدهن الورد وان لم
يمكن دهن الورد فزيت انفاق يجمع الجميع الا الشمع في قدر ويطبخ حتى تذهب العصارتان
وتبقى الميعه والدهن فحينئذ يلتقى الشمع ويغلى حتى يمتزج مع الدهن ثم ينزل ويرفع
ويطلى منه على الجرب في الشمس او عند النار ويبقى فيه يومين وليلتين^{h)} ثم يدخل في
الثالث الحمام ويغسل بنخاله القمح ودقيق الفول منقوعين في الخلⁱ⁾ ثم يعمل ذلك ثانيه
وثالثه فان جميع الجرب يذهب ولا يبقى منه على الجسم شئ^{j)} .

دهن الحنظل^{k)} . - يؤخذ من الحنظل خمسون مثقالا وفر بيون ثلثون مثقالا لبن الشبرم
عشرون مثقالا يرض الحنظل رضا حسنا ويصب عليه من الماء ثلاثة ارطال ويترك

a) from دهن مع to ثلث رطل missing B₂. The same phrase is repeated twice B₃
b) B₃ الابيض W c) Missing B₂ d) جميع اصناف الجرب missing B₂ e) B₃ missing W
f) B₃ crossed out g) from زيت الورد to لم يتمكن من h) S او ثلاثه
i) S الظل j) This formula, according to al-Zahrāwī,
was devised by Ibn Māsawayh (Mesūie the Elder) من تأليف ابن ما سويه

فيه ثلاثة ايام فاذا كان في اليوم الرابع حمل على النار وصب عليه من الزيت العتيق رطل وطبخ بنار لينه حتى يذهب ثلثا الماء ويبقى الثلث ثم يصفى تصفيه رقيقه ثم يرمى بالنفل ويعاد الدهن في القدر فاذا انحل فيه شحم الحنظل القى الفرييون ولبن الشبرم مسحوقين متخلين ثم يشاط شوطا^a حسنا وينزل عن النار ويرفع فاذا اردت ان تعالج به من الخام والرياح الساكنه في البطن فاسق العليل مثقال سكينج عند فومه فاذا اصبح فاسقه مثقالا آخر بما فاتر وادهن به باطن قدميه وبين وركيه فانه يخرج الخام اخراجا عجيبا وهو سهل من غير ان يسقى سكينج .

صفه دهن يحلق الشعر . - مثل النوره لابن ما سويه يوخذ من القلى جز ومن النوره جزان ومن الزرنج الاصفر عشرة اجزا يجمع ذلك ويصب عليه من الماء مقدار ما يكتفى به ويترك يوم^b ثم يصفى ثم ترده عليه اعلم هذا حتى لا يبقى من قوة النوره شئ ثم تاخذ من اى دهن شيت جز^c ومن هذا الماء ثلاثة اجزا فتطبخه طبخا رقيقا حتى يذهب الماء ويبقى الدهن ثم تصفيه في قاروره فاذا احتجت اليه في سفر او حضر طلعت منه فانه لا يلبث ان يحلق الشعر فان احببت ان لا تكون له رائحة الزرنج فالى فيه زنة^d درهم زعفران .

وهذا الدهن ذكر ابن الجزار انه اصابه بخط يد اسحق بن عمران وقد اضاف^e الى ابن ماسويه ولم يجربه .

صفه دهن^f يمرخ به العضو^g . - فيشعل فيه الحاراه على المكان . يستعمل في علل المفاصل الباردة يوخذ فلفل وجندبادستر وفر بيون من كل واحد مثقال عاقر قرحا مثقالان سحق ويلقى عليه اوقية دهن القسط ويمرخ به العضو مرخا شديدا .

دهن الخلبه . - يوخذ من الخلبه اربعة ارطال^h ومن الزيت منا والمز رطلان ومن نصب الذريره نصف رطل ومن السعدى العراقى رطل تدق الذريره والسعدى وتنقعهما في الزيت مع الخلبه سبعة ايام وتحركه في كل يوم مرات كثيره ثم تصفيه وتقصه وترفعه . صفه دهن يسقاه المسلولون . - بما الشعير ولبن الاتن اذالم تكن حمى وحراره بما اختبره

وجربه احمدⁱ بن الجزار .

a) تساط سوطا W b) يومه B₃, S, W c) missing B₂ d) missing B₁
e) اضاف W f) دوا B₃ g) This whole passage on rubbing liniment
prescription is missing S h) missing B₂ i) missing B₂.

يؤخذ زبيب منزوع العجم عشرون درهما مخيطا مايه حبه عتاب مايتا حبه واصل السوس^a
 عشرون درهما خيار شتبر منقى مثل ذلك يطبخ بخمسه ارطال ما حتى يبقى رطلان ونصف ^(b)
 ويلقى عليه من زبد الفم اوقيتان ودهن حب القرع اوقيه ونصف ويطبخ حتى يذهب
 الما ويبقى الدهن ويصفى ويستعمل على قدر الحاجة .

^a) السوس B₃

^(b) رطلا (one "ratl" and a half) B₃.

ENGLISH TRANSLATION OF THE RECONSTRUCTED
EXCERPTS FROM THE 25 TH TREATISE

by Sami Hamarneh

The Olive Oil. — In many ways it varies in regard to its strength, nature, and being useful or harmful. This is because it could be new, old, or intermediate. It could be also [the product] of salted olives, or from olives that were mingled with leaves, or from olives that were buried in subterranean repositories to rot. Of it [the oil], some is extracted with [the aid] of potable water, some from olives dried in the sun until all the water is evaporated then stored, some extracted by oil-press without water, and some extracted by fire. The oil also differs according to lands and locations, another factor that contributes to the variations in its strength, nature, and in being useful or harmful. However, the oil which is extracted from green unripened olives is called by the Greeks the 'Infāq' oil. *) ¹⁾.

*) The reconstructed Arabic appears p. 81 preceding this English rendering. The footnotes indicate lacunae and variants that could alter the intended meaning, and the reading we prefer and, when necessary, the reason for it. Variants that could not change the meaning, including punctuation and spelling, will not be mentioned. Whenever additions of any consequence have been inserted in the translated texts, the words concerned have been set apart by brackets to signify the following:

() = parenthetical remark by present authors; words explanatory to text;
[] = words being added to the literal text as found in original manuscript.

¹⁾ The word "infāq" or "unfāq," from the Greek "omphakion," designated the oil extracted from unripened olives. (*Mūsā Abī 'Imrān Maimonide, Un Glossaire de Matière Médicale de Maïmonide*, ed. and tr. by Max Meyerhof (Cairo, 1940), 64.) Olive oil has been well known and manufactured in various ways since remote times. It was repeatedly mentioned in the Bible (*Genesis*, 28: 18; *Exodus*, 27: 20; *Isaiah*, 1: 16) and was used still earlier. At an early date in antiquity, olives seem to have been introduced to northwestern Africa and Spain, and perhaps since then have been cultivated there. (Friedrich A. Flückiger, and Daniel Hanbury, *Pharmacographia, A History of the Principal Drugs of Vegetable Origin* (2nd ed., London, 1879), 418.) Of pharmaceutical interest is the method of preparing the colorless and odorless olive oil, "al-rikābī," for use in compounding medicines. This improved vehicle was not originated by al-Zahrāwī, however. It enhances the possibility of keeping the incorporated drugs from deterioration for a longer period, and it helps to avoid interference with the color of the compounded material.

Dioscorides proposed that the 'Infāq' oil is Greek [in origin], ¹⁾ but we call it 'oil of the water.'

The 'Duhn' al-Rikābī'.—The oil should be washed—according to this method—until it becomes colorless and odorless, when it will be called the 'duhn al-Rikābī.' It was so called inasmuch as it constitutes a vehicle for all [substances] that are mixed, dispensed and applied with it. Here is how it is [prepared]: Take new oil good in smell and delicious to taste, with no apparent quality or strength, ²⁾ and put it in wide pots in the sun. Then add potable water to it; and lift up [the oil] with scoops and change the water day after day. ³⁾ This is done continuously until [the oil] whitens and becomes colorless. Leave it until the oil floats to the top of the water, collect and take out for [storage]. This you do if you are in a town where there is no glassware.

But to wash it in glass containers is more elegant and much better. Take a glass container, of such size as to hold two to three 'ratls,' ⁴⁾ having two openings, one narrower than the other. The

¹⁾ Dioscorides describes the therapeutic uses of The 'Infāq' oil and recommends it as the best among all kinds of olive oil for healthy people. (*La 'Materia Medica' de Dioscorides*, Arabic tr. by Ṣiṭhān ibn Baṣīl and corrections of Ḥunayn ibn Ishāq, ed. by César E. Dubler and Elias Terés (vol. 2, Tetuan and Barcelona 1952-57), 35-7).

²⁾ This phrase is not entirely clear in the text. Probably it means that the oil is a neutral vehicle, at its best when devoid of any of the four qualities that give a substance therapeutic activity in the Galenic scheme of humoral pathology.

³⁾ This ambiguous clause is stated in the same manner in all four texts. But one infers that it means something like this: Wash the oil with water in the pot by shaking; wait until the oil floats to the top; take the oil with a scoop into another pot, and add a new amount of water for washing, and so on.

⁴⁾ The "ratl" and other measures and weights used in this period and mentioned in this treatise have been listed below, together with today's equivalent:

Ratl = one pound weight or one pint measure = 128 $\frac{4}{7}$ dirham, or 12 ouqiyah, or $\frac{1}{2}$ manā (see W. f. 522; and M. Jungfleisch, "Notations conventionnelles se reconstruant sur certains poids arabes en verre," *Bulletin de l'Institut d'Égypte*, 32 (1950), 257-274.

Midd = 1 $\frac{1}{3}$ ratl or $\frac{1}{4}$ ṣā'.

Qasṭ (pl., aqsāt) = $\frac{1}{2}$ ṣā' or 2 midd (pl. amdād).

Mithqāl = 1 $\frac{3}{7}$ dirham (dram).

Ouqiyah = 10 $\frac{5}{7}$ dirham (dram). Al-Zahrāwī considers the ouqiyah equal to 10 dirhams of "duhn."

Dirham (dram) = 8 dāniq.

Dāniq = 8 $\frac{2}{5}$ grains (continued, next page).

wide opening—which could be closed by the thumb—is at the top, and the narrow—which is only wide enough to pass a probe—is at the bottom. Then pour in the oil and the hot water, to two-thirds of the container's capacity, then put your thumb on the mouth [the top opening] and your finger on the hole [the bottom opening] and shake well. Then leave in the sun for an hour until the oil floats to the top of the water. When the oil floats to the top of the water then take off the piece of cotton—which was put in the bottom [opening]—and let the water drain. Do the same repeatedly until [the oil] whitens and becomes colorless and odorless.¹⁾

Calculated from section five of the 29th treatise of *al-Taṣrīf* with reference also to other works such as: Muḥammad ibn Aḥmad al-Khwārizmī, *Mafātiḥ al-ʿUlūm* (Cairo, 1342 A.H. [1922 A.D.]), 11-12; Edward W. Lane, *Arabic-English Lexicon* (Book 1, Part 3, London, 1867), 1102; P. P. E. Guigues, *Le Livre de L'Art du Traitement* (Beirut, 1902), xvi; and George C. Miles, *Early Arabic Glass Weights and Stamps* (New York, 1948), 6-19.

¹⁾ This device will be recognized as a crude form of the present-day separatory funnel; the process is the one still used to wash substances out of a liquid by shaking with an immiscible solvent. The method described by al-Zahrāwī reminds us of the way some practicing pharmacists used an ordinary funnel, in lieu of a separatory funnel, up to the present century (e.g., see Henry V. Arny, *Principles of Pharmacy* (2nd ed., Philadelphia, 1923), 141). Indeed the Roman glass funnel pictured by Umberto Tergolina-Gislanzoni-Brasco, *Civiltà Romana: La Farmacia* (Mostra della Romanità, No. 12, Rome 1939), P. 26, would have been useable as a separatory funnel in much the same manner that al-Zahrāwī describes. Hans Schindler, in a recent historical paper, stated that the separatory funnel "as we know it, seems to have been in general use for not much more than a hundred years. . . ." (Hans Schindler, "Notes on the History of the Separatory Funnel," in *Journal of Chemical Education*, 34 (1957), 528-530). Schindler, and others, seem not to recognize that in beginning this facet of history with Berzelius and with Faraday in the early nineteenth century, they refer to a form of separatory funnel and a technique that had remained virtually unchanged for at least eight hundred years. Compare the device and technique described by al-Zahrāwī in the above passage, for example, with J. J. Berzelius, *Chemische Operationen und Gerätheschaften*, translated into German by F. Wöhler and published as Volume 10 of "Lehrbuch der Chemie" (4th ed., Dresden and Leipzig, 1841), 493 and Figure 36 in Plate VI. The separatory funnel pictured by Berzelius (noted above) reminds us also of a Greco-Roman amphora with the tip broken off. However, according to Martin Levey, *Chemistry and Chemical Technology in Ancient Mesopotamia* (Amsterdam, 1959), 16-17, the basic principle of the separatory funnel appears to have been applied already in ancient Mesopotamia. He describes a wide-mouth earthen pot with a small orifice protruding near the bottom to be a separatory vessel for non-miscible liquids that dates back to 3600 B.C.

The 'Duhn' of Bitter Almond.—The method of extracting its 'duhn' follows: Take two 'ratls' of bitter almond, clean and dry it thoroughly, then pound and crush well with one-half 'ouqiyah' of boiled water, in a wooden mortar, until it becomes [as soft] as the brain. Knead it then well by hand and if you see the 'duhn' coming out from among your fingers [then it is done], otherwise you add boiling water a little at a time until you see the 'duhn' coming out. Be sure not to add too much water to render the almond like unto milk and spoil [it] and the 'duhn' will not come out. [If the 'duhn' came out] then [put it] in a clean cloth and press it by hand. When the 'duhn' starts to come out from among your fingers, collect it gently and store. Then pour more boiling water on the remaining pressed substance and leave it until [the water] is absorbed. Do the same as you did before until all the 'duhn' comes out. The quantity of the 'duhn' which will come out [will be equal] to one fourth of it, and at the most one third will come out of it. Therefore, the quality of the almond will be measured according to the 'duhn' [extracted] from it, and in accordance to countries, the age and softness of the almond. ¹⁾

The 'Duhn' of Laurel.—The manufacturing of its 'duhn' is well known. Most of this 'duhn' comes to us from the West near Sabtah (Ceuta) due to the great number of [laurel trees] found there. It is [extracted] in this manner. Take the grains of laurel when very ripe, pound the grains, put into a big pot and pour on more water, and cover it above. Then cook over a low fire until the 'duhn' shows on top of the water, and collect it gently.

It could be prepared by another method: That is to take five 'ratls' of the 'rikābī' oil and one 'ratl' of the grains of laurel. Pound [the grains] and cook well with the oil, press, take out and store. ²⁾

The "Duhn" of Wheat.—The method of extracting it is as follows:

¹⁾ That is to say, if the extracted "duhn" is less than one fourth of the original quantity, then the quality of the almonds was not good. The dry seeds of bitter almond used by al-Zahrāwī come from the tree *Amygdala* seeds of bitter almond used by al-Zahrāwī come from the tree *Amygdala* (*Rosaceae*), which is indigenous to countries bordering the Mediterranean Sea. Hence the tree apparently was known in the native country of al-Zahrāwī.

²⁾ Most commonly the cherry-laurel leaves (common laurel) were employed for pharmaceutical preparations, but al-Zahrāwī insists upon the use of the seeds of laurel for his "adhān."

Put clean wheat inside of a glass bottle plastered with 'lutum sapientiae', and shut the mouth of the bottle with thin yellow fibers of flax, which are at the mouth of the bottle to prevent the wheat from falling out when the bottle is turned upside down. Take a brazier and make a hole in the middle just to pass through the mouth of the bottle, downward; and put close to the mouth of the bottle a container to receive [the 'duhn'] that drops down from the wheat. Put around the bottle dry fuel and light it up with fire, whereupon the 'duhn' drops and is collected to be used as we recommended. It is marvelous.

It could be prepared also by another method: That is to take the wheat and put it on a piece of marble, then heat a thick iron-plate and put over the wheat, whereupon the 'duhn' comes out and is collected gently. This method of collecting it is usually done by the blacksmiths. ¹⁾

"The 'Duhn' of Castor-Oil Seed.—The extraction of its 'duhn' is in this manner: Take castor oil seeds which are already ripe on the trees; lay them in the sun and when they break out of their shells and fall down, collect the interior; put into a mortar, and pound until it is very soft. Then transfer it into a pot and pour water over it and boil. When all its 'duhn' comes out, take the pot off the fire, collect all the 'duhn' in a piece of wool and put aside until need arises.

It could also be extracted as the 'duhn' of almond is extracted; but as its substance is placid, it therefore requires skill and gentleness.

The 'Duhn' of Mustard.—The method of extracting its 'duhn' is to take the seed and grind it well, then macerate in warm water, mix a little oil with it, press in a thick cloth, and store.

The 'Duhn' of Radish.—The method of extracting its 'duhn' is well known, since painters in Egypt extract it frequently. And due to its abundance they [in Egypt] light it in the lamps instead of the [olive] oil.

The 'Duhn' of Black Cumin. ²⁾—The manufacturing of its 'duhn'

¹⁾ Cf. 'Abd Allāh ibn Aḥmad ibn al-Bayṭār, *al-Jāmi' li Mufradāt al-Adwiyah wa al-Aghdhiyah*, (vol. 1, pt. 2, Cairo, 1291 A.H. or 1874 A.D.), 116. Here Ibn al-Bayṭār follows *al-Taṣrīf* almost verbatim, without mentioning that the last method was followed by the blacksmiths.

²⁾ *Nigella Sativa* Linn. See Max Meyerhof, *Un Glossaire de Matière Médicale de Maimonide* (Cairo, 1940), 183.

is in this manner: Take two 'raṭls' of black cumin, put on a plate and fry until it bursts open, then leave to cool, and pound until it becomes as the brain. Thereafter, take water in which fenugreek was macerated for one day and one night; after straining off the fenugreek, pour it into a cooking-pot and heat. When it warms up, add the black cumin to it and let come to a boil once or twice. Then take it off the fire, and gently collect the 'duhn' with your palm, and place into glassware and store until need arises.

The 'Duhn' of Chick-peas.—Take the chick-peas and crush into grit. Then take a casserole and place the chick-peas in it and bind [the mouth] with a piece of cloth. Then take another casserole of a wider mouth than the pot in which the chick-peas were placed and invert it over the pot which contains the chick-peas [in a way] that its mouth be inside the opening of the empty pot, then plaster with mud. Thereafter, dig a pit and place the empty [pot] so that the one filled with chick-peas remains outside. A gentle fire is then applied to it until the chick-peas get sweaty, and its 'duhn' comes out and drips into the empty pot—God the almighty willing.

The 'Duhn' of Eggs.—The extraction of its 'duhn' is in this manner: Take ten eggs, boil, take off the eggshells, and place them in an iron ladle. Then raise the ladle over a live coal fire until the eggs burn, the 'duhn' comes out, and the yolk turns jet black. Then store in a bottle.

It could also be extracted according to the [following] method that I obtained from some of the manuscripts, which mention its usefulness for all the body's diseases and any unknown ailment. It is a proven medicine that aids pregnancy and heals the uterus for bearing of children. Take the eggs, cook as they are, and when cooked, take out the yolk, rub down and put it—unmixed with anything else—in a piece of clean white cloth. Then take a new casserole, half filled with potable water, and when heated suspend the piece of cloth containing the yolk over the water by means of a wooden rod traversing the mouth of the casserole without letting the cloth touch the water. When it becomes softened by the effect of heat on it, take out, knead gently and press, for it responds to pressing. Its oil will then come out and is collected in a glass container and stored. It is tested.

The 'Duhn' of Elder Balsam. ¹⁾—For extracting its 'duhn' tear the branches of balm tree into shreds with a lancet. The 'duhn' will flow down from it and is collected. Certain sages mentioned that it is to be found after the rising of Dogdays. This elder balm tree, from which this 'duhn' is [extracted], grows in particular in the land of Egypt in one of its cities called Heliopolis.

Naphtha. ²⁾—[It] is two kinds: manufactured and natural. The natural flows out from springs, black, of putrid smell, and becomes white after it rises up. The manufactured is made from certain 'adhān'; and both kinds are used. They both are hot in the fourth degree and have the faculty to attract fire.

The 'Duhn' of Snakes.—The method of its extraction is to take three 'aqṣāṭ' [8 'raṭls'] of the 'duhn' of sesame and transfer into earthenware, and cast into it five to ten of the black snakes, according to the smallness or largeness of the snakes. Then take down from the fire and let it cool for a while. After that, open the top with caution [so not to inhale] the vapor, and leave until it cools off and the vapor is gone; strain, transfer into a vessel, and use according to our description.

Another method could be used for the extraction of its 'duhn' as follows: Cast [the snakes] into the boiling water and cook until they come apart. Then collect the 'duhn' from the top of the water and store. When need arises for it, mix this 'duhn' with a convenient portion [of the 'duhn'] of sesame and use, for it is much stronger—God the almighty willing.

The 'Duhn' of Flying Ants.—Take a thousand flying ants and macerate in one 'raṭl' of the 'duhn' of white lily, suspend in the hot sun for two weeks and anoint with it.

The 'Duhn' of Henbane (hyoscyamus).—The method of extracting its 'duhn' ³⁾ is in this manner: Take some of the newly dried white

¹⁾ *Balsamodendron opobalsamum*. See Dioscorides, *Materia Medica*, Arabic Version, 27-9, and English version, ed. by Robert T. Gunther (New York, 1959), 18-19.

²⁾ Dioscorides, *Materia Medica*, Arabic version, 77, Gunther's English version, 53.

³⁾ Al-Zahrāwī preferred the seeds of *Hyoscyamus alba* because certain of its qualities were not equally attributed to *Hyoscyamus niger*. (Simon Morelot, *Nouveau Dictionnaire Général des Drogues* (vol. I, Paris, 1807), 742-3). On *Hyoscyamus niger* and *alba* and their uses in the Middle Ages, the

seeds of henbane, pound and knead with hot water. Then put in the sun, and what dries is mixed again with the rest repeatedly until it becomes black and soft. Press in a thick woolen cloth, collect the 'duhn' gently, put in a container and store.

The 'Adhān' that are Compounded from Simple Drugs—The methods of its manufacture are many, some old and some new, and its benefits are also numerous. The old methods of manufacturing which we mention from Galen and the ancient sages are three. The first, take one 'ratl' of olive oil, which is known as the oil of 'Infāq', or the washed oil known as 'al-Rikābī,' and put it into a vessel glazed inside and outside. Then put four fresh roses over the 'ratl' [of oil] and close the mouth of the vessel and hang toward the sun for forty days. If it is done, strain and store in a glass container. This method of manufacturing is the best of all, the most graceful in essence, and the most penetrating in the bodies.

The second method, however, is to take the same amount of the oil and the roses and hang it ¹⁾ in the well, but not in touch with the water, and leave it there for two months. Then take it out, strain, and store. In this method of manufacturing, the rose odor remains strong in it, but the substance [of the 'duhn'] is slow in its penetration in the bodies, not having the same elegance and penetrating [power] of the first.

The third method of manufacturing is to take the same quantity, but the vessel in which the [material] has to be put is coated with honey from inside. After that you put in the oil and the roses, close the mouth of the container well, and bury it in a pit in the ground and cover it with earth. Be sure it is not in a place where water or any strong humidity could touch it, and leave it there for two months.

But the method of manufacturing the 'duhn' of rose that has been discovered by the people of Iraq is in this manner: Take whole unhusked sesame and spread on a sheet in the shade by putting one layer of it and one layer of roses. Leave for one day and night and then take off the roses. Repeat, adding new roses to it

reader may consult Hermann Fischer, *Mittelalterliche Pflanzenkunde* (München, 1929), 217.

¹⁾ That is to say after putting it in the container.

and do that a few times until the sesame takes in the roses' odor. [Take this sesame] from which the roses were separated, grind it in a grinding mill, press it, and store the 'duhn'. The best of it is that which had the roses repeatedly layed upon it more than three times. But that to which [roses were applied] fewer times will vary accordingly in the function thereof, [concerning] usefulness and strength.

All this 'duhn' that comes to us [in Arabic Spain] from the East [the countries under the domain of the Eastern Caliphate] is a common [commercial] 'duhn' having only little of the roses' faculty, whereas the faculty of the sesame is predominant, since the roses only have been applied once or twice. Moreover, [this 'duhn'] could be first, second, or third class. The first pressed 'duhn' which comes out is smooth and fragrant; of lesser quality is that which is extracted next; and the third is inferior to the other two. This is because it has thickness therein, and more of the sesame than of the 'duhn' of rose; hence the effect of roses in it is weak. This third class of 'duhn' is called "the wandering" (al-rāḥilīn), because it is sent to other lands and distributed in many countries [for sale]. Here in our midst in Cordova a wonderful and unmatched kind of 'duhn' used to be made on which the roses were applied repeatedly.

This method of manufacturing the 'duhn' is very nice because the sesame accepts the quality of the roses and nothing of its body. Hence, it becomes elegant and more penetrating than all that are [obtained] by other methods. Therefore, whosoever wants to prepare it best let him repeat laying the roses on it (the sesame) five to seven times, and take the top of the first extraction and use.¹⁾

*The 'Duhn' of Myrtle.*²⁾—There are two methods for manufac-

¹⁾ It is possible that al-Zahrāwī used for his "duhn" of rose the species known as *Rosa Damascena*. In Islamic countries rose water was known long before the time of al-Zahrāwī, but we know of no definite description of its preparation in classical writings. The oil of roses spoken of by Alexandrian alchemists, Forbes concludes, is not the product of distillation but of decoction. (R. J. Forbes, *Short History of the Art of Distillation*, Leiden, 1948, 28). Not before the tenth century was distilled oil of roses, using the cucurbit, mentioned by Byzantine authors. In regard to the "duhn" of rose, possibly the method of preparation discovered in Iraq, as mentioned by al-Zahrāwī, contributed to the development of the "Enfleurage à froid," which is mainly the extraction of essential oils from blossoms and herbs by the use of oils and fats.

²⁾ *Myrtus communis* Linn. See Meyerhof, *Glossaire Maïmonide*, 10.

ing because some of it is made of the tender leaves, and some is made of blossoms, that is, the flowers. Now, [for extracting the 'duhn' from flowers] take three 'ouqiyahs' [of flowers]; add to it one 'ratl' of the 'duhn al-Rikābī' and suspend in the sun for forty days, then strain and store.

Another method is to 'rob' ¹⁾ with sesame, as we described it in discussing the 'duhn' of rose and the 'duhn' of violet; then express and store. This way of manufacturing it, is the best of all methods, which makes it especially more desirable for admixture with anointing spices worthy of use by kings and men of wealth and luxury.

Of this 'duhn' some is also made of the leaves and is of three kinds:

[1] That is to take a quantity of the tender leaves of myrtle, pound, express, and mix their juice with the oil of 'infāq.' Then cook until the juice is gone and the 'duhn' remains.

[2] Or else, pound well the leaves of myrtle and cook them in water or, even better in syrup, until the water accepts the quality of its ['duhn'], then strain. Add to that water (the filtrate) an equal quantity of the oil of 'infāq' or of the 'duhn' of vinegar and cook until the water is gone, as before, then strain into a glass container.

[3] Or take of the tender leaves of myrtle and macerate in the oil of 'infāq' and put in the sun for forty days until the 'duhn' accepts the faculty of the myrtle.

The 'Duhn' of Camomile.—[*Anthemis nobilis* Linn.] For the manufacturing of its 'duhn,' take the tops of flower-buds, and put over the 'duhn al-Rikābī,' and suspend in the sun for forty days, then strain and store. Or if so desired, it could be made by 'robbing' with sesame and expressing its 'duhn'. It also could be made in this manner: Take the tender, green, undried tops, pound and express them. Then take the juice and add to it an equal part of the 'duhn' of sesame; place over the fire and cook until the juice is gone. Do that repeatedly, for in so far as you add more of the juice to it the resulting 'duhn' will come out stronger, more fragrant and more useful.

¹⁾ "Robbing" with sesame was mentioned under the manufacturing procedures of the 'duhn' of rose, according to the method newly devised in Iraq. Here, of course, the roses are replaced by the flowers of myrtle.

The 'Duhn' of Wormwood.—¹⁾ For the manufacturing of its 'duhn' take one 'raṭl' of the green flowering tops at the prime of their fragrance, and add to it four 'raṭls' of the oil 'al-rikābī' or any other oil, and suspend in the sun for forty days, then strain and use.

Also if desired, it could be made into a 'rob' with sesame, as mentioned previously under other 'adhān' (see pp. 105-107).

The 'Duhn' of Daphne Laureola. ²⁾—This 'duhn' is derived from mezereon bark, and in its uses it replaces the 'duhn' of rose. But the manufacturing of its 'duhn' is in this manner: Take one part of the mezereon bark and pound to a soft powder. Then add to it an equal part of the oil of 'infāq' or the oil 'al-rikābī'; macerate three to four days, express and store. If so desired, however, suspend toward the sun, as previously mentioned in other 'adhān.' And if desired, place on the fire for quicker [result] but the sun [method] is more desirable.

The 'Duhn' of Mezereon.—³⁾ For the manufacturing of its 'duhn', take one 'raṭl' of the green Daphne laureola, pour over five 'raṭls' of water, and boil until only two 'raṭls' remain, and strain. Then pour over it three 'ouqiyahs' of the 'duhn' of sweet almond, cook until all the water vanishes, and store for use when need arises.

The 'Duhn' of Basil.—⁴⁾ For the method of its manufacturing, take two 'raṭls' of the 'duhn al-rikābī' and add over it one 'raṭl' of the already pounded basil. Then suspend toward the sun, or add the water to the juice and cook gently, and strain. Thereafter, add 'duhn al-rikābī' on the filtrate, cook until the water is gone and the 'duhn' remains, then strain and store.

The 'Duhn' of Emblic.—⁵⁾ There are two methods for its manufacture: In the first, take one 'raṭl' of emblic and add to it six 'raṭls' of water. Cook until four 'raṭls' are gone and two 'raṭls'

¹⁾ *Artemisia absinthium* Linn. According to H. P. J. Renaud and Georges S. Colin, *Tuḥfat al-aḥbāb, Glossaire de la matière médicale marocaine* (Paris, 1934, [4]).

²⁾ *Daphne Laureola* Linn. See Meyerhof, *Glossaire Maïmonide*, 118, and Renaud and Colin, *Tuḥfat*, 119. It is an evergreen spice, which was often used as a substitute for *Daphne mezereum* Linn. (Flickiger and Hanbury, *Pharmacographia*, 540-2).

³⁾ *Daphne mezereum* Linn., see *ibid.*

⁴⁾ *Ocimum Basilicum* Linn.; see Meyerhof, *Glossaire Maïmonide*, 26.

⁵⁾ *Phyllanthus embellica* Linn. or *Emblica officinalis* Gaert. (Euphorbiaceae) Renaud and Colin, *Tuḥfat*, 21.

remain. Then strain and add to it two 'ratls' of 'duhn al-rikābī' or the oil of 'infāq.' Cook until the water is gone and the 'duhn' remains; then strain and store.

If desired, however, pound and macerate it in the oil and suspend towards the sun until the oil takes over the faculty of the drug, then strain and store.

The 'Duhn' of Mastic.—¹⁾ For the manufacturing of its 'duhn,' take one 'ouqiyah' of the [gum of] mastic, pulverize, and pour over it one 'ratl' of 'duhn al-rikābī.' Place over a coal fire and stir continuously until the mastic dissolves, and the 'duhn' accepts its power, then take down and strain.

If stronger and more odorous ['duhn'] is desired then macerate one half of an 'ouqiyah' of each of the aromatic rush ²⁾ and of calamus ³⁾ in the 'duhn' and leave it therein suspended, towards the sun, for several days, then strain and store until need arises—God the almighty willing.

The 'Duhn' of Melissa.—⁴⁾ For its manufacture take one 'ratl' of 'duhn al-rikābī' and add to it one-fourth of a 'ratl' of tender melissa. Close the opening of the container and suspend in the well for forty days, then strain and store. Yet, if so desired, [suspend] towards the sun, but that which is suspended in the well is stronger in fragrance and more odorous, while that exposed to the sun becomes milder. However, if the melissa were replaced each week, the resulting ['duhn'] will be much more useful and stronger in activity.

The 'Duhn' of Styrax.—For the manufacturing of its 'duhn,' take two 'ratls' of the 'duhn' of sesame and four 'ouqiyahs' of the dry styrax. Cook in a double boiler until the 'duhn' accepts the faculty and the odor of the styrax, then take down, strain and store for use. But, if so desired, suspend towards the sun, as we have described.

The 'Duhn' of Citron.—⁵⁾ There are several methods for manufacturing the 'duhn'.

¹⁾ *Pistacia pentiscus* Linn. of the family Anacardiaceae. See Renaud, and Colin, *Tuhfat*, 112.

²⁾ *Andropogonis schoennanphus* Linn. See *ibid.*, 18.

³⁾ *Acarus calamus* Linn. See Meyerhof, *Glossaire Maimonide*, 164-165.

⁴⁾ *Melissa officinalis* Linn., *ibid.*, 22.

⁵⁾ *Citrus medica* Risso, See Renaud and Colin, *Tuhfat*, 13.

[1] Take a piece of cotton and dip it in [oil of] sesame, then take it to the citron while growing upon its tree and paint it with [the oil each day] for forty days. Then pick [the citron] and press over it a fine silver spoon, with which the 'duhn' gradually will be obtained, and store.

[2] It could also be made in this manner: Take small, aromatic citron tasting like thyme, and pour sesame over it to cover the citron. Then leave until the sesame takes out the faculty of citron, whereupon you replace it with [another] citron. Do that as many times as you wish the potency of the 'duhn' to be, then express the sesame to extract its 'duhn,' and store.

[3] Or if so desired, peel the citron, and take the rind and make it into 'rob' with sesame, then extract [the 'duhn'] and store it.

[4] It [the 'duhn'] is made [as follows]: Take the citron when well ripened, and keep for one night. Then take a smooth-edged shell or a smooth-edged perfume jar made of silver, and strip gently [the skin of] the citron without scratching it, lest a part of the body comes out. When you collect that which is needed, then put it into a goblet already fumigated with fragrant ambergris twice or thrice. [Each time], the 'duhn' is to be transferred from one [already fumigated] container to another. Consequently, the more fumigations that are applied, the more fragrant and potent the 'duhn' will be to aid the brain. Put it later on into a narrow-mouthed bottle and close its opening with wax, and store. This 'duhn' is one of the greatly recommended 'adhān' to be combined with various perfumes worthy to be used by kings and men of wealth and luxury.

The 'Duhn' of Apples.—The method of manufacturing its 'duhn' is like that in manufacturing the 'duhn' of citron, whereby the sweet, tender apples are 'robbed' with the sesame, then the sesame is expressed and used.

Or by taking its rind when tender, then macerate it in 'duhn al-rikābī' and suspend towards the sun until the 'duhn' takes out the faculty of the apples, and then use—God the almighty willing.

The 'Duhn' of Colocynth.—To manufacture its 'duhn' take the pomegranates [fruits] of colocynth, ¹⁾ peel off and draw out only

¹⁾ *Citrullus colocynthis* Schrader (family, Cucurbitaceae), a herbaceous perennial found in Spain as well as in North Africa, Syria, and Cyprus.

the seeds, leaving the fat [pulp] thereof. Then fill in with oil and suspend towards the sun for one month, after which the 'duhn' is strained and stored. Or if hastily needed, then put [the fruits] as they are filled with oil over a fire-heated stove ¹⁾ until the oil warms up, then strain and store. Another method: Take about four 'ratl' of the juice of green, well-ripened colocynth, and pour one 'ratl' of the 'duhn' [al-rikābī] over it. Then place over the fire and cook until the juice is gone and the 'duhn' remains, then strain and store.

But if green colocynth is not available take the dry, throw out its seed and the rind. Then take one-fourth 'ratl' of its fat [pulp], and add it to one 'ratl' of oil, and cook until the faculty of the colocynth is drawn out; then store for use.

The 'Duhn' of Squirting Cucumber.—²⁾ The manufacturing of its 'duhn' is done in several ways: One way is to take [the squirting cucumber], pound and take its juice, and add to it equal parts of oil. Then cook until the juice is gone and the 'duhn' remains. Another is to take the squirting cucumber while green, cut and macerate in oil, using twice the quantity that covers it, close the mouth of the vessel and suspend towards the sun forty days or so, then strain and store.

Or else, especially if [the squirting cucumber] is dry, cook in water first, then strain away the water and add [the squirting cucumber] to the oil. Cook until the water is gone and the 'duhn' remains, then strain, and store until the needed time.

The 'Duhn' of Oleander.—³⁾ [It] is useful in [treating] wet scabies, and banishes it completely. It is tested. Take one 'ratl' of the juice of oleander, then add to it one-half of a 'ratl' of the oil of rose ⁴⁾ or oil of 'infāq,' and cook it until the juice is gone and the 'duhn' remains; strain and store. Or it is possible to add wax or fat instead of the 'duhn,' but the 'duhn' is far better. Then apply it [to the

¹⁾ Heated, smooth stones were usually used for cooking, roasting or heating purposes.

²⁾ *Ecballium elaterium* Rich. (Cucurbitaceae). See Meyerhof, *Glossaire Maimonide*, 142.

³⁾ *Nerium oleander* Linn. See *ibid.*, 52.

⁴⁾ All four scribes here wrote "oil" (زيت) yet it is clear from the following sentences that 'duhn' is intended.

body externally as an ointment] and leave for one day and one night; then enter into the bath. Repeat this until the scabies is cured. This 'duhn' also kills the nits wherever found on the body.

Comments

The pharmaceutical excerpts translated above reveal an author who is thoroughly practical and rational in his approach, who is both knowledgeable and evaluative concerning pharmaceutical details. And one hardly can escape the feeling that he brings to his writing long first-hand experience.

Al-Zahrāwī shows his familiarity with methods developed in Islamic lands; but authorities he cites suggest also his acquaintanceship with relevant writings of antiquity, or at least with their content. He refers repeatedly to Dioscorides and to his recommendations concerning certain oils; ¹⁾ and he mentions Galen and the recommendations of other classical writers, without ignoring the tradition of his own land. ²⁾

The scope of this treatise centers upon products of direct interest for medicinal use, although the author abjures discussing the "adhān" of widely manufactured oils that are known even to the public. ³⁾

Noting the careful description of techniques, the warning against inferior grades of "adhān", the comment on proper glassware and other equipment, and attention to cleanliness and accuracy, we can infer how much the pharmaceutical side of medical care had been elaborated in Arabic Spain and that the author himself may have been as much pharmacist as physician. Indeed, most of this twenty-fifth treatise is devoted to matters pertaining more or less to pharmacy.

The author selects his material from earlier writings and manufacturing processes of both the Eastern and Western caliphates. Traces of Paulus of Aegineta also can be discerned. For example,

¹⁾ For example, Dioscorides, *Materia Medica*, Arabic version, 82, 116-117.

²⁾ See al-Zahrāwī's praise of the "duhn" of rose that was made in Cordova. (B2, fol. 396 a-397 b.).

³⁾ Al-Zahrāwī mentions in the text that he does not intend to elaborate upon methods of extracting oils that are widely employed and known, such as the extraction of the 'duhn' of sesame. (W. fol. 19 b.).

Paulus' discussion of olive oil, almonds, and wheat centers around their dietetic properties, as well as their uses in medicine.¹⁾ Unlike al-Zahrāwī he does not mention laurel, and he devotes only a few lines to the therapeutic value of roses.

Al-Zahrāwī seems notably disinterested in alchemy in its relation to medicine, in contrast to the influential al-Rāzī.²⁾

If we look to al-Zahrāwī's famous Eastern contemporary, we see that al-Majūsī gives no attention to methods of manufacturing the "adhān," perhaps depending upon the pharmacists in the Eastern Caliphate to take care of such matters. Like al-Rāzī in his "aqrābādhīn," al-Majūsī in the second part of *al-Malikī* devotes the entire section on "adhān" to the compounded prescriptions containing them and to their therapeutic use.³⁾

Al-Zahrāwī not only describes the preparation of the "adhān" as such, but in several instances mentions more than one method of manufacture, pointing out which methods are more satisfactory than others and how to obtain a product of good quality. While it is not easy to assess the extent to which he or his associates in Cordova elaborated on traditional techniques, which are so clearly and ably discussed in the twenty-fifth treatise, it can be seen that the author did not hesitate to modify processes when his own experience and observations so indicated.

Furthermore, in the case of adding one simple drug to his "adhān" al-Zahrāwī generally recommends two main methods: First, by suspending the blossoms (or other parts of the plant used in

¹⁾ Paulus Aegineta, *The Seven Books of Paulus Aegineta*, tr. by Francis Adams (London, 1844-7), 1: 121, 135-6; 3: 41, 99-100, 314.

²⁾ Among many chemical matters discussed by al-Rāzī, we mention only a few examples: his description of the cucurbit and alembic in their uses for distillation; maceration and distillation of flowers (without separating the oil from the water); refining of minerals (such as copper, mercury, and sulfur, and their salts), and the application of various alchemical processes (Forbes, *Distillation*, 38, 48).

³⁾ 'Alī ibn 'Abbās al-Majūsī, *al-Malikī* (vol. 2, Cairo, 1294 A.H. or 1877 A.D.), 585-588. To gain an impression of al-Rāzī's treatment of similar material, the manuscript of *Kitāb al-Hāwī al-Kabīr* in the Cushing Collection at Yale University was examined on microfilm (described in Harvey Cushing Collection of Books and Manuscripts, New York, 1943, P. 6). Likewise, we have checked the Osmania Oriental Publication Bureau edition of *Kitābu'l-Hāwī fi'l-Tibb*, (Hyderabad, India, 1955-59), based upon the Escorial manuscripts Nos. 807 and 810 and Bahlawari Ms. (بهلوازی).

medicine) towards the sun in a certain vehicle, or by repeated "robbing" of that part of the plant with sesame for better and more elegant production. Second, by cooking the tender leaves (or other parts of the plant) in water or syrup and extracting the "juice" by cooking it with sesame or by maceration in oil. Other pharmaceutical processes, such as pounding, kneading, and drying, are also employed by the author, as required.

Therapeutic Uses of the "Adhān"

As in the previous part on technology, we shall here present translated samples of the text (Arabic, pages 90 ff.) on therapeutic uses, followed by a commentary.

The [Olive] Oil.—It is not my intention in this treatise to discuss the [olive] oil as a diet but as a drug. For [as a diet] I have mentioned it in detail in my treatise on aliments. Therefore we say that the best kinds of oils are those of sweet-smelling, good taste, free from pungency and acidity, its astringency is apparent, and more inclined to coldness and dryness. This kind is recommended for the treatment of weak organs, and therefore it enters into the ointments that need astringency as well as to strengthen the organs. It is more convenient in manufacturing the 'duhn' of rose than any other. The oil that has been extracted from black, well-ripened olives, humidifies and gives moderate warmth, relaxes, loosens, and stretches the organs, and relieves from fatigue when applied externally as a liniment. Dioscorides in referring to the oil said: 'All kinds of oil are warming and softening to the skin, relaxing to the organs, and if applied externally on the skin they prevent perspiration from coming out of the body's pores. They are a protective to bodies from the fast reach of cold, [help] to weaken the viscous poisons, and assist in bowel movement.' But Dioscorides mentioned this in general, and after thorough examination [Dioscorides' approach] needs more explanation and definition in view of what we have already described concerning the many varieties of oil, [but] to go into such detail would carry us far away from the purpose and scope of this work.

If, however, [one] drinks nine 'ouqiyahs' (three-fourths of a pint) of oil and the same amount of barley water, together with

warm water, it will purge the bowel; and if cooked with syrup and while hot, nine 'ouqiyahs' of it are taken in, it relieves colic caused by excess of thick humors; and [assists] in the emission of worms,¹⁾ and tapeworms from the bowels; and if given in the form of a rectal enema it relieves colic caused by the swelling of the bowels and the obstruction caused by impaction. If old oil is also applied to the eyes it sharpens the sight.

The 'Duhn' of Bitter Almond.—It is useful in the pains [hyster-algia], retroversion, and the hot tumors of the uterus, hysteria, headaches, earache, ringing of the ear, and it kills the worms generated in it (the ear), helps in liver and spleen obstruction, useful in asthma, nephritis and dysuria. If [the 'duhn' of bitter almond] is mixed with honey, the roots of the lily of the valley, wax, the 'duhn' of henna, and the 'duhn' of rose, then applied to the chest externally, it relieves asthma. Likewise, if it is applied externally to a patient with sclerosis and splenauze it will be useful. It also removes the marks from the face caused by superfluities of the body, freckles, relaxes facial spasm, and if applied to the tired sight [eyes] relieves perturbation. And if mixed with wine and applied to the scalp it will be useful against wet ulcers and the dandruff therein.

The 'Duhn' of Sweet Almond.—²⁾ The 'duhn' of sweet almond is mild in the middle of the first degree and useful in opening liver obstruction. It is useful in soothing and humidifying the coarseness of the chest and lung, the burning of urination, in dissolving hard tumors, and in relaxing spasm everywhere.

The 'Duhn' of Laurel.—Its faculty is warming, soothing, and it [helps] to widen the opening of the veins. It relaxes the organs, relieves all pains of the organs, as well as the chills, earaches, colds, and headache. If taken internally it nauseates and hurts the one who drinks it. It is specially useful to cold bodies, and assists against itching, chronic scabies, hardening of the skin, and ring-worm caused by salty phlegm if applied in the bath. It also kills worms wherever found in the body, [rids] from nits and lice, washes

¹⁾ This kind of worm is probably ascaris.

²⁾ Al-Zahrāwī indicates that the method of preparing the "duhn" of sweet almond is similar to that of bitter almond (see B2, fol. 393 b.).

out the dandruff, and helps in alopecia and ophiasis. It should be applied the first hour of the day, and at the fifth [hour] the patient takes a bath after washing his head with honey and flour of fenugreek. The patient who applies this 'duhn' should be careful in case the temperament of his head or his whole body is hot.

The best of the 'duhn' of laurel is the kind made of new, green, very bitter, and pungent [laurel seed] which, due to its acidity, purges strongly when one 'dirham' of it is drunk with two 'ouqiyahs' of julep syrup. In that way it can be harmful to the internal organs, although it is useful for dropsy.

The 'Duhn' of Wheat.—It is hot [and] helpful in [stopping] ringworm at the start, if used as follows: Rub the ringworm with coarse cloth until it is almost going to bleed, then apply the 'duhn' on it; repeat the same procedure until it is healed—God the Almighty willing.

The 'Duhn' of Henbane.—It is cold, anaesthetic to senses, and useful in sleeplessness. If used as nose drops it [helps] to relieve headache and nagging headache caused by yellow bile.

[It is useful] also in itching and scabies, and when mixed in vaginal suppositories it relieves the pains of the uterus. It may be applied to nit-beds on the ailing body, and they will be killed. It is also rubbed on the temples to bring gentle sleep, and if a few drops from it are put in the ear it relieves earache.

The 'Duhn' of Caster Oil Seeds.—It is useful in scabies and wet ulcers of the scalp, the swellings in the anus, the closure of the opening of the uterus, the retroversion of the uterus, and the unseemly scars resulting after the healing of deep wounds. Also useful for earache, helps induce menses, purifies the nerves from entangling viscidities, and if taken internally it loosens the bowels and expels the worms from the belly. Also, if it is applied to alopecia it cures.

The 'Duhn' of Mustard.—It is hot and mild, good for chronic cold ailments. It also dries up and purifies moisture, and helps in alopecia, the pains of the joints, paralysis, tremor, ataxia, facial paralysis, and trembling. Furthermore, it helps in the case of a sting from the scorpion and from all creeping creatures except snake bite. If it is applied to the back of the head, after it is shaven with the razor, it helps against forgetfulness, strengthens the memory,

loosens the phlegm which causes that [forgetfulness], and it warms the nerves.

The 'Duhn' of Eggs.—It is good for the pains of the anus and throb thereof. It is also useful in the earache and toothache.

The 'Duhn' of Daphne Mezereum.—[It is] hot and purges the yellow water (dropsy). For internal use, take two 'dirhams' by weight [mixed] with the latex of mandrake, and it will purge the yellow water of dropsy.

The 'Duhn' of Emblic.—The 'duhn' of emblic is cold and astringent. Its property is to strengthen the stomach and the anus, as well as cure the hemorrhoids. If also applied to the hair it prevents it from falling, strengthens its roots, and blackens it.

The 'Duhn' of Rose.—Before we mention the methods of its manufacture, let us discuss here its uses in general, then we shall describe the methods of its manufacture. I shall also mention in detail and with definition the uses of each kind, to make our description clearer and fuller. Therefore we say that the 'duhn' of rose is one of the best [and] miraculous 'adhān,' and its uses are numerous and important. It is moderately cold and astringent; neither its coldness nor its astringency is noticeable. And neither is its purgative action extremely strong, nor is its constipating [action] powerful. It moves the bowel if a large dose is taken, and it causes constipation if a moderate dose of it is employed. Especially if taken with laxative substances, then it is wanted for purging; but if taken with astringent substances, it causes constipation. It relieves also all pains caused by heat, and if used internally it helps against inflammation of the stomach; and if applied externally it renders the same effect. If it also is added in drops to certain syrups used for hepatitis, gastritis, and colitis, it helps. If taken with washed, fire-toasted psyllium it ameliorates bowel movement caused by strong laxative drugs and bowel excoriation. Likewise, if taken with ewe's milk it helps burning urination and bladder and relieves their pain, as well as it helps in nephrelcus, nephritis, and in sugar diabetes—the disease in which the patient drinks too much water and quickly passes it. Likewise it acts when applied externally or when mixed with vinegar and poured over the head to calm the headache caused by the glare of the sun, poisons, and hotness of fever and pleurisy. And if mixed with vinegar and applied to

the body it relieves blotch, itch, and scabies. All this should only be done after purging the body. Likewise in the case of a blow on the head resulting in a fracture of the bone wherein the inner skin of the brain appears, pour over the injured head the warm 'duhn' of rose instead of the blood of ray or dove, for it will help to quiet the pain and the hot swelling therein. And if taken with barley broth it helps in the beginning of tuberculosis, lung ulcer, and the consumption caused by dissolution of the main organs. If given as an enema it aids in the excoriation of the bowels and relieves the pain. If injected in the urethra together with certain medicated drops ¹⁾ or with women's milk it relieves the burning and excoriation of the penis, and if rubbed externally on the body it assists in profuse perspiration, and if old [ulcerated] abscesses are covered by it the flesh will grow again. If made into an ointment together with the white of a boiled egg and applied to an aching, inflamed eye it soothes [the pain], and if made together with white wax into a cerate and applied to chapped hands, legs, and lips, and to the blains of the nose it helps. Likewise if applied by a piece of cotton on [the place of] an extracted tooth it relieves the pain, and if used as a gargle together with plantain ²⁾ it helps in mouth ulceration and thrush. It is also useful if applied alone or with white wax in all sores caused by yellow bile and hot blood, such as erythema, erysipelas and fire burns. The 'duhn' of rose might enter into several [kinds] of troches and ointments that are useful in hemorrhage, and it could be blended with many of the hot, strong drugs employed internally. The physician [seeing] all these numerous benefits, may then compare the few with the many, the exposed with the concealed, and the present with the unseen, and by good conjecture and by use of his own judgment he could arrange things according to their order and worth. What we have mentioned thus far, in regard to the benefits of the 'duhn' of rose, should be sufficient.

¹⁾ Al-Zahrāwī here gives no specific information concerning the composition of these medicated drops.

²⁾ This apparently is the *Plantago decumbens* that grows in Arabia and Egypt and was referred to by several writers in Islam. Flückiger and Hanbury (*Pharmacographia*, 490) and Fischer, (*Pflanzenkunde*, 216) refer to several species of this plant.

The 'Duhn' of Marjoram [*wild mint*].—¹⁾ It is useful in fatigue if applied externally in the sun or in the bath; and if fumigated with or added into poultices it will help in paralysis and facial paralysis. And if used as nose drops it drives out the winds (colds) and helps in cold ailments. And if used as ear drops it quiets the ringing of the ear and resolves the winds in it, particularly if made into a rob together with the ['duhn' of] almond, as it also acts as emmenagogue, and helps in the sting of a scorpion. In the better kinds the fragrance of the marjoram is strong.

The 'Duhn' of Colocynth.—²⁾ It is useful in the cold ailments, and if taken internally it purges much mouldy phlegm and expels the worms and the tape-worm from the bowel; and it does the same if mixed with kamala, ³⁾ and applied to the umbilicus. If given as an enema, it helps in colics caused by thick superfluities. And if applied to the head it removes the dandruff and prevents the falling of hair. Also if used as ear drops it relieves the ringing of the ear and kills the worms that generate in it, and if taken on a piece of cotton and applied—while very hot—upon an aching tooth it relieves the pain; and so it takes away all the cold aches wherever they are, if applied on the affected areas.

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Comments:—In his *al-Taṣrīf* in general, and in this 25th treatise in particular, al-Zahrāwī is not mainly interested in pharmacologic interpretations of why a medicine is administered, as has been maintained. ⁴⁾ The views he does express, however, lie within the framework of the humoral theory that came down from classical times and was elaborated upon in Arabic writings. He therefore

¹⁾ The botanical origin of this aromatic plant is the mint family, species *Mentha bulegium* Linn., which is common in South Europe and Spain and certain parts of North Africa, besides many other areas. Flückiger and Hanbury, *Pharmacographia*, 486; see also Meyerhof, *Glossaire Maïmonide*, 116-7.

²⁾ Apparently it is *Cucumis colocynthis* Linn., judging from the Arabic phrase used by al-Zahrāwī (الحنظل الساذج); see Meyerhof, *Glossaire Maïmonide*, 78; and Dioscorides, *Materia Medica*, Arabic tr., 367.

³⁾ Kamala or kamela is apparently *Rottlera tinctoria* (the *Mallotus philippinensis*, Müller), a large shrub or a small tree that grows in Arabia, India, and the Philippines and other areas. Its glandular powder is used in medicine. See Flückiger and Hanbury, *Pharmacographia*, 572-573.

⁴⁾ For example, Aldo Mieli, *La Science Arabe et son Rôle dans L'Évolution scientifique mondiale* (Leiden, 1938), 182.

speaks of drug therapy in terms of the four humors, and he refers to the Hippocratic qualities of his medications as being hot and cold, wet and dry, and to the Galenic degrees of their quality. In this treatise al-Zahrāwī does not describe the diseases to be treated, but rather he relies upon what he already has mentioned in previous treatises, particularly in the first two.

In several instances al-Zahrāwī recommends practical steps for better therapeutic results in applying the "adhān"; for example, he mentions the form of preparation, and if externally used he indicates whether the 'duhn' should be applied before or after bathing, or in sunshine or in shade, and so on. If the "duhn" is to be taken internally, he sometimes mentions the dosage and how, when, and with what the medicine should be administered.

He does not escape the temptation of generalizing the therapeutic effects of certain "miraculous adhān," assuming results beyond what could have been observed. Al-Zahrāwī does usually present such sweeping statements with an indication of specific conditions in which a 'duhn' is more particularly recommended.

In certain cases, he adds details not found in Dioscorides, who no doubt influences him greatly. He asserts gently that Dioscorides has been too general in his presentation of the uses of olive oil in medicine, and has overlooked that there are several kinds of oil that vary in quality. Al-Zahrāwī adds that one should be specific in the presence of such differences, which require consideration inasmuch as they influence the therapeutic effects.

The author was selective in choosing and organizing his material. He first devotes a section to the "adhān" alone, and to their manufacture, properties and medicinal uses. Then he proceeds one step further—as in the case of the "duhn" of rose—to discuss instances when a simple drug should be added to a "duhn" to increase or to improve its quality and therapeutic effectiveness.

In Paulus we do not find such an explicitly organized, detailed and well thought out approach. It seems probable that both Paulus and al-Zahrāwī, in describing a good number of these "adhān"—such as of laurel, almonds, henbane and colocynth—have relied heavily upon Dioscorides.¹⁾

¹⁾ Dioscorides, *Materia Medica*, Arabic tr., 39-41, 82, 367.

In Islam, both al-Rāzī and especially al-Majūsī were interested, as al-Zahrāwī was, in the use of the "adhān" in medical treatment, but less concerned with the various methods of their preparation. Al-Rāzī, on the one hand, gave a thoughtful discussion of the therapeutic applications of certain "adhān" (coconut for example) and was quoted by later authors, such as Ibn al-Bayṭār.¹⁾ al-Majūsī lists a number of these "adhān", and beside each he adds the therapeutic effects.²⁾ He generally emphasized pharmacologic interpretations.

Although al-Zahrāwī copies much from his predecessors, he adds his own observations and experience; and he himself was to be relied upon by later authors. Al-Ghāfiqī, for example, refers to al-Zahrāwī's botanical medicine,³⁾ and Ibn al-Bayṭār quotes him almost verbatim in describing the methods of manufacture and use of the "duhn" of wheat.⁴⁾

Compounded Drugs in the "Adhān"

In poly-pharmacy, al-Zahrāwī follows the trend of his time. His procedure of mixing several drugs into the "adhān" for medicinal purposes has pharmaceutical interest. In numerous instances these compounds include so many drugs that it was then impossible to judge the effect of each individually.

Selected excerpts (Arabic, pp. 94 ff.) have been translated below, which are intended to be representative of this part of the 25th treatise.

The 'Duhn' of Marjoram. — This is useful in hysteratresia, retroversion and tumors of the uterus caused by colds. [It is also useful] in pains and in nausea caused by hysteralgia. Likewise it promotes menses, pushes out the placenta, relieves backache, and sciatica, promotes perspiration and resolves fatigue.

¹⁾ 'Abd Allāh ibn Aḥmad ibn al-Bayṭār was born at Malaga in Arabic Spain and died at Damascus in 1248 A.D. He became famous for his valuable botanical works. See his vol. 1, pt. 2 of *al-Jāmi'*, printed in Cairo, 1874-5.

²⁾ Al-Majūsī, *al-Malikī*, 2: 121-122.

³⁾ Aḥmad ibn Muḥammad al-Ghāfiqī was born in suburban Cordova and flourished in the first half of the twelfth century. According to Max Meyerhof ("Arabian Pharmacology in North Africa, Sicily, and the Iberian Peninsula," *Ciba Symposia*, 6 [1944] Nos. 5-6, p. 1869) al-Ghāfiqī was quoted by Ibn al-Bayṭār more than two hundred times.

⁴⁾ Ibn al-Bayṭār, *al-Jāmi'*, 1, pt. 2, 116.

Take one 'ouqiyah' each of: leaves of myrtle, cinnamon of China, marjoram, and thyme; and four 'raṭls' of oil. Pound the drugs, then macerate them in the oil for ten to twenty days, strain and store.

A 'Duhn' Prescribed for the Heat of the Stomach Which Has Weakened Its Faculties, Causing Nausea, Heartburn, and Inflammation in It; a 'duhn' Which We Know Is Useful by Experience.

Take one third of a 'raṭl' each of the waters of: sour grape, bitter pomegranate, tender myrtle, Rose of Damascus, and tender buckthorn. ¹⁾ Put these drugs together with one third of a 'raṭl' each of 'duhn' of rose, 'duhn' of violet, and 'duhn' of sweet almond, on a gentle fire, then add two 'mithqāls' (equals 2 6/7 drams) of sandal-wood and one 'mithqāl' of musk. Cook until all water evaporates and the 'duhn' remains, then strain through a cloth, and liberate by the [addition] of two 'dāniqs' (0.25 dram) of camphor, and store. The dosage for internal use is one to two 'mithqāls'. It is also used externally for rubbing the body.

A 'Duhn' Prescribed for Moving the Bowels.—By experience, it helps in colic. Take the blossoms of violet, quince seeds, carthamus seed, linseed, ten 'dirhams' of each, then twenty 'dirhams' of seedless raisins, burless sebeste (*Cordia myxa* Linn.), twenty berries, and ten 'dirhams' of each of caneficer ²⁾ and manna. Collect and cook with four 'raṭls' of water over a gentle fire until one 'raṭl' remains. Macerate and strain, then add to the strained [liquid] half a 'raṭl' of the 'duhn' of sweet almond and half a 'raṭl' of the 'duhn' of sesame and cook until the water evaporates and the 'duhn' remains. Then take off from the fire and store. Give internally two 'ouqiyahs' with warm water, for it is remarkable as we have described.

A 'Duhn' I Composed for Scabies.—It uproots all kinds of scabies in which every other treatment failed. Take of the juice of fresh laurel one 'raṭl' or of the decoction if the juice is not available—although the juice is stronger—and one half of a 'raṭl' of each of

¹⁾ This plant used by al-Zahrāwī is apparently *Rhamnus cathartica*, a plant indigenous to North Africa and a great part of Europe. (Flückiger and Hanbury, *Pharmacographia*, 157, and Guigues, *Traitement, Glossaire*, pt. 1, p. 18.

²⁾ *Cassia fistula* Linn. (Flückiger and Hanbury, *Pharmacographia*, 221).

the water of celery and liquid styrax,¹⁾ and one fourth of a 'ratl' of the yellow wax, and one half of a 'ratl' of oil of rose; and if not possible to obtain oil of rose, then the 'duhn' of rose, and if the 'duhn' of rose is not available, then oil of 'infāq.' Collect all, except the wax, in a pot and cook until the two juices evaporate and the styrax and the 'duhn' remain. Then add the wax and boil until it mixes with the 'duhn', take down and store. Apply it on the scabies, either in the sun or near the fire. Leave on two days and two nights, and in the third day go into the bath and wash with wheat-bran and bean flour, both soaked [previously] in vinegar. Do this a second and third time, then all the scabies will be gone and nothing will remain from them on the body.

The 'Duhn' of Colocynth. ²⁾—Take fifty 'mithqāls' of colocynth, thirty 'mithqāls' of euphorbia [*Euphorbia resinifera* Berg] and twenty 'mithqāls' of buckthorn. Crush the colocynth well and pour over it three 'ratls' of water, and leave it three days. In the fourth day put it over the fire and pour on it one 'ratl' of the oil, and cook on a gentle fire until two-thirds of the water is gone and one-third is left. Then strain gently and throw the lees away. Put the 'duhn' back in the pot, and when the pulp of the colocynth dissolves in it put in the euphorbia and the buckthorn, which have been pulverized and sifted. Then boil and stir well, take off the fire and store. In case you wish to treat with it ill-smelling excrement and flatulence in the abdomen, give the patient one 'mithqāl' of sagapenum ³⁾ before bedtime. In the next morning give him another 'mithqāl' with lukewarm water and rub with [the 'duhn'] the soles of his feet, and between his thighs, for it will remove the excrement in a wonderful way; ⁴⁾ it even purges without the internal use of sagapenum.

¹⁾ *Liquidambar orientalis*, Müller, or *Styrax officinalis* Linn. (Flückiger and Hanbury, *Pharmacographia*, 271).

²⁾ According to the author this prescription was devised by Yūhannā ibn Māsawayh (777-857).

³⁾ Sagapenum is a gum-resin. According to Flückiger and Hanbury (*Pharmacographia*, 324) it was frequently used in medieval pharmaceutical preparations, and Lane (*Lexicon*, Bk. 1, pt. 4: 1389) refers to Persian influence in its introduction into medicine.

⁴⁾ Therapeutic usage of the duhn here included both internal as well as external application.

A Prescribed 'Duhn' for Hair Removal.—Like unto 'al-nūrah' ¹⁾ of Ibn Māsawayh. Take one part of the 'qili' (soda ash; potash), two parts of the 'nūrah' and ten parts of yellow arsenic (arsenic trisulfide). Collect them together, pour over them a sufficient quantity of water, and leave for one day; strain; then return [the filtrate] over them again. Repeat this until all the faculty of the 'nūrah' is exhausted. Then take one part of any kind of 'duhn' you desire and from the strained water three parts; cook gently until the water is gone and the 'duhn' remains, then strain into a bottle. If thereafter you need it, whether on a journey or at home, apply it externally, for it removes the hair in not much time. If, however, you wish to get rid of the smell of the arsenic, then throw into it one 'dirham' of safran by weight. Ibn al-Jazzār mentioned that he found this 'duhn' in a writing from the hand of Ishāq ibn 'Imrān [fl. 903 A.D. at Qayrawān] who attributed it to Ibn Māsawayh, while he [Ibn 'Imrān] did not try it.

A Prescribed 'Duhn' to be Rubbed [as a Liniment].—It burns heat into the organ where it is applied. It is used in cold ailments of the joints. Take one 'mithqāl' [$1\frac{1}{3}$ dram] of each of pepper castoreum [*Castor fiber* Linn.] and euphorbia ²⁾ and two 'mithqāls' of pyrethrum. ³⁾ Pound, and add to it one 'ouqiyah' of the 'duhn' of costus, ⁴⁾ then rub the organ therewith very well.

The 'Duhn' of Fenugreek.—Take four 'raṭls' of fenugreek, three 'manās' of oil—the 'manā' equals two 'raṭls'—half a 'raṭl' of calamus aromatica, and one 'raṭl' of Iraqi edible 'souchet.' ⁵⁾ Pound the calamus aromatica and the 'souchet' well, and macerate with the fenugreek in the oil for seven days. Stir several times each day, strain, express the 'duhn' out, and store it.

A Prescribed 'Duhn' Given to Patients in Consumption as a Drink. This is [to be administered] with barley water or the milk of an ass, in the absence of fever and heat. It has been tested and proven by

¹⁾ A depilatory powder composed mainly of arsenic trisulfide and lime; see Ḥasan 'Abd al-Salām, *Dhakhīrat al-'Aṭṭār* (Cairo, 1942), 191.

²⁾ *Euphorbia resinifera* Berg. or *Euphorbia officinalis* Linn.; see Renaud and Colin, *Tuhfat*, 111.

³⁾ *Anacyclus pyrethrum* Linn. (family Compositae); see *ibid.*, 134.

⁴⁾ Probably *Schleichera oleosa*, indigenous to the region of Tibet and India.

⁵⁾ *Cyperus esculentus* Linn. (Meyerhof, *Glossaire Maïmonide*, 79); a well known simple used during the Middle Ages (Fischer, *Pflanzenkunde*, 192).

Ahmad ibn al-Jazzār. Take twenty 'dirhams' of seedless raisins, one hundred fruits of sebestena (*Cordia myxa* Linn.), two hundred fruits of jujub (*Aria (sorbus) torminalis* Linn.), twenty 'dirhams' of the roots of glycyrrhiza, and an equal amount of the Persian catarthocarpus fistula¹⁾ after being thoroughly cleaned. Cook all these in five 'raṭls' of water until two and one half 'raṭls' remain, then add to it two 'ouqiyahs' of sheep's butter together with one and a half 'ouqiyah' of the 'duhn' of gourd seed. Then cook [again] until the water is gone and the 'duhn' remains, strain and use as needed.

*

Comments.—All through his discussion of the 'adhān' we see that al-Zahrāwī usually points to the areas and diseases in which some simple or compounded 'duhn' is helpful or a cure. Then he presents actual quantitative formulas by weight or by volume, or sometimes even by number if specifying seeds, berries or fruits, accompanied by a careful description of the technique involved in preparing these "adhān" for immediate or future use.

The author mentions a number of the "adhān" that he has tried personally and found commendable. He also presents others that he himself has devised and recommends enthusiastically.

In this part, more than in other parts, al-Zahrāwī has been more specific in mentioning the doses employed for each medication. This is to be expected since several potent drugs are included, sometimes several of them in one formula. Furthermore, he is careful to specify the particular part of the plant used, whether the root, seeds, leaves, or flowers. The major part of the simples used in this treatise are taken from the "plant kingdom," with not much attention to mineral and animal drugs, which the author employs more extensively in the twenty-eighth treatise ("Liber Servitoris"). But the scope of the twenty-fifth treatise is circumscribed by the title itself.

Al-Zahrāwī mentions the authors on whom he has relied in compiling his material. These men include classical, pre-Islamic, and Arabic authors. The latter seem more prominent as sources for al-Zahrāwī in this last part than in the two parts of the twenty-fifth treatise previously discussed. One was al-Rāzī, who presents in his

¹⁾ *Cassia fistula* Linn.; see Renaud and Colin, *Tuhfat*, 179.

'aqrābādhīn a great number of compounded drugs for various diseases and many forms of pharmaceutical preparations, such as the "adhān." ¹⁾ Al-Zahrāwī was likewise acquainted with the works of a famous physician, Ibn al-Jazzār of Qayrawān (Tunisia today), whom he also copied, with full credit. Other physicians in Egypt, North Africa and Spain influenced al-Zahrāwī, whereas, al-Majūsī, his contemporary, depended more on the classical writers and upon al-Rāzī and other physicians of the Eastern caliphate, where he lived. Yet in his section on compounded "adhān," al-Majūsī described only sixteen of them, less than one-fourth the space devoted to them by al-Zahrāwī. Nevertheless, in comparing some of the "adhān" mentioned by both writers we find similarities that suggest common sources, which go back in most cases to classical authors.

Viewing this treatise in general one may conclude: First, the material compiled by al-Zahrāwī was systematically organized in a lucid way. Second, the sources of information from which al-Zahrāwī drew his text were extensive. Third, he was a keen observer and a careful and concise writer, who described intelligently the practical aspects of pharmaceutical topics. In several cases he modified a procedure and added his own observation or experience. Fourth, al-Zahrāwī's major concern—as stated in his introduction to the whole *al-Taṣrīf*—was to provide the practitioner or the student with a manual of such wide scope, yet so concise and practical, as to serve the health professions in dealing efficiently and promptly with the problems of the individual patient.

¹⁾ See W. fol. 41 a., 49 b., and 58.

CHAPTER SEVEN

CONCLUDING REMARKS

In the early decades of the tenth century Arabic Spain had been absorbing the intellectual output coming from the East and from North Africa ("al-Maghrib"), including much of the Greek legacy in the health field, which was being intertwined with Arabic additions. The country was progressing socially, economically and educationally, under a stimulus from its greatest ruler thus far, al-Nāṣir (912-61). Shortly after the middle of the century the major part of Dioscorides' *Materia Medica* was translated into Arabic at Cordova and soon became available for use in this new version. Then and soon afterward several works in the health field and other areas of learning were written by eminent physicians of the second half of the century. No longer was Spain in a heavily dependent state intellectually.

Al-Zahrāwī came upon the scene during this most favored time in the history of Arabic Spain. He felt the need for a work embracing the major aspects of the health field, to fill a gap in the literature then available in the Western Caliphate. This work was to be designed as a single, practical, encyclopedic source that the student of medicine as well as the practitioner could turn to for guidance, instruction and advice. Probably about the close of the tenth century, al-Zahrāwī's long experience and work and study were turned to meet this need resulting in his famous *al-Taṣrīf liman 'Ajiza 'an al-Tā'līf*.

AL-ZAHRĀWĪ AND HIS WRITINGS

Al-Taṣrīf is the only literary contribution known to be written by al-Zahrāwī, and it alone established his fame in the history of the health field through the centuries. His prestige rose high in Spain, in North Africa and the Eastern Caliphate, but still more notably later in Western Europe.

Al-Zahrāwī wrote his work with enthusiasm and with care. He realized the need this work would help satisfy, and he met it effectively in at least three respects.

First, by his advice and careful suggestions he showed his keen interest in promotion of the health professions and in his students and other practitioners who would use his work.

Second, by his description of apparatus and his techniques and approaches, he revealed deep understanding of what he was doing and presenting.

Third, he pronounced his devotion to his profession in presenting the best that the arts of healing could offer the patient at his time. Hence, he recommended the best of care, medication to be prepared and stored under the best possible conditions, the safest methods for administering medicines and diets, and conformity with the best principles of the profession then known.

Through the approach used here to analyze *al-Taṣrīf*, it will be apparent what a wide scope and rational appreciation al-Zahrāwī gave to this work, a level of pharmaco-medical authorship that hardly was achieved in Arabic Spain before his time. This tends to establish al-Zahrāwī as a peer of the eminent contributors to the health field in the Eastern Caliphate. Although the author recognized his debt to earlier and contemporary Arabic writers, yet the organization, style, many personal observations, drawings, and experiments appear to be his own.

AL-ZAHRĀWĪ AND THE HEALTH FIELD

In *al-Taṣrīf*, the author studied and discussed the various areas embraced by the health professions as then known.

As a physician, he studied diseases and their classification, diagnosis and prognosis, considered the importance of anatomy, temperaments, meteorology, and discussed means of preventing disease, promoting health and relieving pain.

As a surgeon, he did what no other Arabic surgeon did before him in presenting his surgical treatise in careful detail, enriched with beautiful illustrations of the instruments he used. In depicting and describing these instruments for instructive purposes he probably stands as the first in the history of surgery.

As a "pharmacist," al-Zahrāwī surpasses all expectations, in view of the previous historical literature. His elaborate discussion of forms of medication, technique and apparatus well deserve our attention and respect. A look into the table of contents of *al-Taṣrīf*

reveals the space and the number of treatises al-Zahrāwī devoted to studies pertaining to the field of pharmacy, and some of these interesting aspects have been here presented. Especially have we examined the "adhān" of the twenty-fifth treatise, which is almost unremembered in printed literature. Indeed, except for al-Zahrāwī's twenty-eighth treatise (the famous *Liber Servitoris*), little has been known of his place in pharmacy; yet we have shown that a majority of the thirty treatises in *al-Taṣrīf* are pharmaceutical or related to the subjects of pharmacy, which places the work in a new historical light. The author himself, however, repeatedly emphasized his interest in pharmaceutical preparations and their significance in promoting better medical treatment.

Al-Zahrāwī did not reveal who had the responsibility at this time in Spain for using the rich pharmaceutical knowledge and array of techniques that he describes. He seems to have made no mention of a separate profession of pharmacy or pharmacy shops in Cordova, save certain places where the popular "adhān" or manufactured products used in medicine were prepared. Al-Zahrāwī primarily addresses medical practitioners. We have seen that many such practitioners in Spain (see Chapter I) might be termed physician-pharmacists, who prepared medicines and devised new forms and "brands" of pharmaceutical preparations, which they then dispensed to their patients. If recognized pharmacists had been serving the health field, one might suppose that the author would have had occasion to mention them. This of course does not rule out the existence of perfumers or spicers called "aṭṭārīn" (جمع عطارين), who were mentioned in his discussion of special standards of weights and measures in the last section of the 29th treatise. But this is not the class of professional pharmacists to which we refer. The present study thus tends to confirm the speculation that no separate class of pharmacists arose in Spain before the end of the tenth century. This is unlike evidence we encounter for the Eastern caliphate, where professionalized pharmacy existed early in the ninth century in an identifiable way.

We are inclined to believe that the extensive instruction, description and information disclosed in the work of al-Zahrāwī may have helped decisively the development of professional pharmacy in Spain, as well as contributing to pharmaceutical progress in general.

APPENDIX ONE

PROPORTIONAL SIZE OF THE TREATISES OF *AL-TAŞRİF*

To provide an impression of the general order of magnitude of the individual treatises, the following tabulation has been prepared from comparative examination of available copies. The percentages must not be read literally for reasons explained in Chapter IV (p. 42).

Number of Treatise	Folios in a "typical" Ms. Copy	Approximate magnitude in per cent
1	32	4.3%
2	163	21.7
3	8	1.1
4	9	1.2
5	6	0.8
6	8	1.1
7	7½	1.0
8	8	1.1
9	7½	1.0
10	6	0.8
11	10	1.3
12	8	1.1
13	15	2.0
14	8	1.1
15	6	0.8
16	12	1.6
17	11	1.5
18	14	1.9
19	26	3.5
20	11	1.5
21	11	1.5
22	14	1.9
23	27	3.6
24	8	1.1
25	19	2.5
26	27	3.6
27	58	7.7
28	28	3.7
29	26	3.5
30	156	20.8

APPENDICES

APPENDIX TWO

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ARABIC MANUSCRIPTS EXAMINED THAT CONTAIN
PART OR ALL OF *AL-TAŞRİF*

Microfilms of extant Arabic manuscripts varied in their contents from part of a single treatise to the entire work. To allow the reader to detect easily the copies of each treatise eventually obtained and examined during this study and to determine in what particular manuscripts a treatise is found, we furnish the following table:

Abbreviations: Numbers 1 to 30 = treatises of *al-Taşrif* one to thirty
(Inc.) = Incomplete
Fol.tr. = folios transposed

1 Bank. 16 Bes. 502 Bes. 503 Sch. Madr. 5007 Taym. Wien 476 B	2 Bank. 16 Bes. 502 Bes. 503 Sch. Madr. 5007 Taym. (Inc.) Wien 476 B Len. (Inc.) Par. 6208 (Inc.) Rab. 635 (Inc.)	3 Bank. 16 Bes. 502 Bes. 503 Sch. Taym.	4 Bank. 16 Bes. 502 Bes. 503 Sch. Taym.
5 Bank. 16 Bes. 502 Bes. 503 Sch. Taym.	6 Bank. 16 Bes. 502 Bes. 503 Sch. Taym.	7 Bank. 16 Bes. 502 Bes. 503 Sch. Taym. Rab. 1427	8 Bank. 16 Bes. 502 Bes. 503 Sch. Taym. Rab. 1427
9 Bank. 16 Bes. 502 Bes. 503 Sch. Taym.	10 Bank. 16 Bes. 502 Bes. 503 Sch. Taym.	11 Bank. 16 Bes. 502 Bes. 503 Sch. Taym.	12 Bank. 16 Bes. 502 Bes. 503 Sch. Taym.
13 Bank. 16 Bes. 502 Bes. 503 Sch. Taym.	14 Bank. 16 Bes. 502 Bes. 503 Sch. Taym.	15 Bank. 16 (Inc.) Bes. 502 Bes. 503 Taym. Tub. 782	16 Bes. 502 Bes. 503 Sch. Par. 5772 Tub. 782

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17	18	19	20
Bank. 16 (Inc.)	Bank. 16	Bank. 16 (Fol. tr.)	Bank. 16 (Fol. tr.)
Bes. 502	Bes. 502	Bes. 502	Bes. 502
Bes. 503	Bes. 503	Bes. 503	Bes. 503
Seh.	Seh.	Seh.	Seh.
Par. 5772	Par. 5772	Par. 5772	Par. 5772
Tub. 782	Tub. 782	Tub. 782	Vat. (Inc.)
		Vat. (Inc.)	
21	22	23	24
Bes. 502	Bank. 16	Bank. 16 (Fol. tr.)	Bank. 16
Bes. 503	Bes. 502	Bes. 502	Bes. 502
Seh.	Bes. 503	Bes. 503	Bes. 503
Par. 5772	Seh.	Seh.	Seh.
Tub. 783	Par. 5772	Par. 5772	Wien 211D.
Vat. (Inc.)	Tub. 783	Tub. 783	
		Vat. (Inc.)	
25	26	27	28
Bank. 16	Bank. 16	Bank. 16	Bank. 16 (Fol. tr.)
Bes. 502	Bes. 502	Bes. 502	Bes. 502
Bes. 503	Bes. 503	Bes. 503	Bes. 503
Seh.	Seh.	Seh.	Ali.
Wien 211D.			Vel.
29	30		
Bank. 16	Bank. 17		
Bes. 502	Bes. 502		
Bes. 503	Bes. 503		
Ali	Ali		
Vel.	Vel.		
Leid. 13 (Inc.)	Tub. 91		
Br. Mus. (Inc.)	Wien 476A		
	Esc. (Inc.)		
	Par. 2953 (Inc.)		
	Rab. 1427 (Inc.)		

An annotated bibliography of the above manuscripts, important to those seriously interested in the sources, will be found beginning on page 137.

Other Known Arabic Manuscripts.—

We know of other extant Arabic manuscripts of parts of *al-Taṣrīf*, which have not been microfilmed either because they are not pharmaceutical (hence lie outside our main field of competence) and are already available in more than three copies; or because they could not be photographed despite repeated efforts.

Since we know of no modern information on *al-Taṣrīf* manuscripts presented systematically elsewhere, we report these additional manuscripts below, as a matter of information and as a stimulus to further search and research:

APPENDICES

APPENDIX THREE

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ARABIC MANUSCRIPTS OF *AL-TAŞRÎF* KNOWN BUT NOT EXAMINED

Since manuscripts here charted have not been examined, the information drawn from the literature and correspondence may not all be as reliable as in Appendix 2. The table offers a ready key to determine which manuscripts reportedly contain a particular treatise. (A key to the manuscript abbreviations was presented on pages x-xi).

1	2	28	29	30
Madr. 2008-30	Madr. 2008-30	Mrk. 21	Mrk. 21	Got. (Inc.)
(Inc. ?)	(Inc. ?)	(Inc.)	(Inc.)	Hunt.
Mrk. 404	Mrk. 404 (Inc.)	Mar. 42	Mar. 42	Leid. 2540
		(Inc.)	(Inc.)	Mar.
				Top.
				Par. 6461
				Par. 6824
				Par. 2953
				Mrk. 21
				(Inc.)
				Bodl. Or. 491
				(Inc.)

The above manuscripts (not consulted) have been listed in a separate section of the Bibliography (beginning page 144), with descriptions and comments to the extent that available information permits.

APPENDIX FOUR

GLOSSARY

Quite a few terms and transliterated words that required immediate explanation were briefly defined as they occurred in the text or in footnotes. More common expressions that could be easily found in a dictionary were used without interpretation. The following list will then include some additional terms that occur repeatedly in the text and that the average reader may not easily find explained fully elsewhere.

A.H.—After the “Hijrah” (immigration of Mohammed from Mecca to al-Madīnah), which commences the Islamic era (starting 622 A.D.) and follows the lunar reckoning. For more precise dates (not only to the year, but to the month and day) we consulted the conversion table by Louis Ma‘lūf, *al-Munjid fī al-Lughah wa al-Ādāb wa al-‘Ulūm* (15th ed. rev., Beirut, 1956) between pp. 820 and 821. See also Giuseppe Gabrieli, *Manuale di Bibliografia Musulmana* (Pt. 1, Rome, 1916), 358-380.

‘Abbāsīd dynasty (750-1258 A.D.)—Arabic dynasty with its seat in Baghdād—save for short intervals—after its founding by Caliph al-Mansūr in 762. Among other distinguished caliphs of this dynasty are Hārūn

al-Rashīd (reigned 786-809) and his culturally enlightened son al-Māmūn (813-833). The dynasty fell under the barbaric invasion of the Tartar in 1258.

Agaric—(Arabic غاريقون) known also as white agaric, *Polyporus officinalis* Fries. The part of the plant generally used is the dried fruit body after removing the outer rind.

Alembic—A cap (with one or more spouts) to cover the still used in this period, serving as a condenser. The word is coined from the Arabic "al-Inbiq" (الانبيق), which in turn is derived from the Greek "ambix," a cover or a cap.

Antidotarium—This term was generally used before the advent of the official pharmacopoeias to signify a treatise or a formulary on simple and compounded medicines, their forms, uses, and therapeutic virtues.

Aqrūbādhīn—This Arabic term corresponds with the Latin "antidotarium," q.v.

"*Bāb*"—Section of a large Arabic work, such as *al-Taṣrīf*. These works were usually divided into treatises; and the treatise or "maqālah" (مقالة) into sections; and the section or "bāb" (باب) into chapters or "fuṣūl" (singular "faṣl" (فصل)).

Barberry—*Berberis vulgaris* Linn. is also known as Oregon grape root and Rocky Mountain grape, including several species. The part used in medicine is the dried root.

Bougies—A form of suppositories mainly for introduction into the urethra. The word is also applied to types of suppositories for the rectum, ear, and nose.

Ceruse—(Arabic اسفيداج أو سبيداج) is the basic impure powder of lead carbonate or white lead, used chiefly as pigment.

Colocynth—The fruit of the wild gourd, known also as colocynth apple, colocynth pulp and bitter apple. The botanical origin is *Citrullus colocynthis* Schrader. The dried pulp of the fruit is used in medicine as a bitter laxative.

Confection—A soft medicated mass, pleasantly flavored and mixed with honey or sugared fruit juice to be eaten or dissolved in the mouth. "Confection" is a form no longer recognized officially, but in a sense it is a precursor to our modern cherry and apple-flavored drugs and medicated candies. It is hard to draw a line between confections on the one hand and conserves and electuaries on the other. The term "confection" also has been applied to certain dry drugs (as powder mixtures to be made into electuaries) and as sweet troches and tabulae ("solid confections").

Conserves—A preserved confection in sugary paste or a medicated sweetmeat, often made from finely cut herbs mixed with powdered sugar.

Cumins—Aromatic, carminative seeds of umbelliferous plants, *Cuminum cyminum* Linn., indigenous to North Africa.

Decoction, Aromated—(al-nakhānikh, النخانخ). A drug or combination of drugs prepared by boiling, then aromated with flavors and spices to make it effective and more agreeable to the taste. In the medieval sense a "decoction" implies cathartic action.

Duhā (pl., *Adhān*)—See chapter VI, p. 77.

Electuary—A medicinal preparation in which the ingredients are usually compounded with honey or syrup in the form of a paste or a confection.

Euphorbium—The dried latex obtained from the stem of *Euphorbia resinifera* Berg (Fam., *Euphorbiaceae*) by incision. It is a plant indigenous to Morocco and is mainly used as a purgative and emetic.

Ferment—This term is to be understood here as the change that certain compounded drugs undergo when left standing in contact with air for a time. The change was then not understood, however.

Hieras—A class of medicaments in which the dominant bitter simples, such as aloes, are modified or disguised with aromatics and spices. Enjoying the reputation of panaceas, they were sold on a wide scale as secret preparations (*nostrums*) in the classical period. They enjoyed increasing demand during the Arabic period.

Humors—The four fluids of the body: blood, phlegm, yellow bile and black bile. According to the Hippocratic and Galenic concept, the harmony or equilibrium among these four humors results in good health, while illness is the outcome of disharmony or imbalance among these body fluids.

Hypocistis—The juice and extract of various species of *cytinus* used as an astringent.

Ibn al-Bayṭār, *Ḍiyā al-Dīn ʿAbd Allāh ibn Aḥmad*—Born in Malaga, Spain in 1197, he acquired his early education there, then travelled extensively. He served the Ayyūbid King, al-Malik al-Kāmil and his son, al-Malik al-Ṣāliḥ, and was appointed chief of the herbalists and sellers of drugs in all Egypt. He died in Damascus in 1248. His famous *Kitāb al-Jāmiʿ* contains a comprehensive list of drugs (over 2000) that was influential in the late Middle Ages. In it, besides his personal observations, he relied heavily upon classical and Arabic writers such as Dioscorides, Galen, al-Rāzī, al-Majūsī, Ibn Sīnā and al-Ghāfiqī. He also incorporated various passages and phrases from *al-Taṣrīf*, particularly from the chapters on distillation, "al-Adhān" (see chapter six), and weights and measures (See H. Sauvaire, "Arab Metrology. V. Traité sur les Poids et Mesures par Ez-Zahrawy," *The Journal of the Royal Asiatic Society of Great Britain & Ireland*, 16 (1884): 496).

Julep—A sweetened mixture or drink, made from various medicinal preparations that were usually kept in the form of a dough.

Kunnāsh—A compendium on medical therapy, or drug preparations and forms, and methods of administering drugs. It is derived from the Syriac language.

Lohochs (*looches*); Arabic لعوق from the verb لَعَق—As the name suggests, this medication is to be taken by mouth in a spoon or in a quantity similar to that taken by spoon. It was often made by mixing powdered drugs with sugar, syrups or honey, to a consistency between that of a thick syrup and an electuary. Lohochs were administered to soothe and cure cough and chest ailments. Ingredients varied greatly, but generally included mucilaginous fruits with honey, almond oil and the like.

Majūsī, *ʿAlī ibn ʿAbbās al*—A famous physician who lived and practiced his profession in Persia during the tenth century. His *Kāmil al-Sīnāʾah al-Ṭibbiyyah*, known as *al-Malikī* (transliterated also *al-Malakī*), was

highly praised in Arabic medicine as the authoritative work before the appearance of *Kitāb al-Qānūn fī al-Ṭibb* of ibn Sīnā in the first half of the eleventh century.

Maqālah—A treatise within a larger work; see under "bāb."

Melilot—A fragrant leguminous herb allied to the cloves (hart's clover) used in plaster or ointment.

Morel—Garden nightshade; a kind of cherry.

Nenuphar—White water lily. The yellow type is called yellow pond-lily.

Plantain, *Plantago psyllium*—the seeds of which are used as a mild laxative in medicine.

Polypharmacy—The fashion of administering many simples and drug preparations together as a single medication. This practice was well known in classical writings, but much expanded in the Arabic period in spite of the fact that many wrote against it.

Rāzī, *Abū Bakr Muḥammad ibn Zakariyyā al.* (864-932?)—Probably the greatest clinician in Arabic medicine. He was an independent thinker and a prolific author whose writings influenced both later Arabic writers and physicians as well as medical development in Western Europe in the Middle Ages. During his career he became the director of the hospital in his home town, al-Rayy in Persia, and of the great hospital in Baghdād.

Rob—(Arabic *rub* رُب or *rubūb* رُبُوب). A medicated jelly of fruit. The inspissated juice of ripe fruit, with or without honey or sugar, is boiled to the consistency of a conserve. Al-Zahrāwī also used robs as vehicles instead of honey for blending medicines.

Sal ammoniac—Known also as muriate of ammoniac. In modern chemical nomenclature it is ammonium chloride. It was first made from burning animal excrements.

Scammony—An inspissated sap, of bitter and acrid taste, obtained from the roots of *Convolvulus scammonia* Linn., a plant indigenous to the Eastern Mediterranean that is used as a purgative in medicine.

Theriac—Used first as an antidote against poisons of wild beasts. Later it was regarded as a general panacea but primarily as antidote. Certain theriacs contained a vast number of simples, including the flesh of serpents, and carried a tremendous reputation for centuries.

Umayyad dynasty—The Umayyad dynasty, with its capital at Damascus, first was founded by Caliph Mu'āwiyah I in 661 A.D., and was overthrown by the rise of the 'Abbāsīd dynasty in Iraq (750). Second, the Umayyad dynasty with its capital at Cordova, in Arabic Spain, was founded by a scion of the fallen Umayyads in Syria, 'Abd al-Rahmān I (reigned 756-788). From 929 to 1031 it was known as the Western Caliphate.

Vinegar Syrup—(*sakanjabīn*; سَكَنْجَبِين). Mainly a mixture of vinegar and honey with which other medications are blended. It is similar to the later oxymel preparations. See Friedrich Dieterici, "Die Abhandlungen der Ichwan Es-Safa in Auswahl," in *Die Philosophie der Araber im IX. und X. Jahrhundert nach Christi*, series no. 11, (vol. 1, Leipzig, 1883), 175.

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I. MANUSCRIPTS OF AL-TAŞRİF

a. Arabic Manuscripts Obtained and Examined

Ali.

The Ali Emiri Arabi manuscript No. 2854 is in the "Süleymaniye Umûmî Kutüphanesi" at Istanbul, Turkey. It contains the twenty-eighth treatise to thirtieth inclusive, in elegant Naskhî script, with beautiful illustrations in the twenty-eighth and the thirtieth treatises.

Incipit, المقالة الثامنة والعشرون في اصلاح الادويه . قال المؤلف

It was written not later than 1177 A.H. (1763 A.D.), a date that was inserted in the first folio of the manuscript, apparently a date of purchase. The scribe is Ahmad ibn Muṣṭafā. Number of folios is 138, with 31 lines per page.

Bank. 16.

The Bankipore manuscript No. 16 in the Khuda Bakhsh O.P. Library, Patna, India, contains twenty-seven treatises (lacks 16, 21 and 30), of which a few are incomplete and partially defective. It is written in both ordinary and superior Maghribî script and probably by more than one copyist. On the first folio are inscribed religious aphorisms attributed to a certain al-Shaykh al-Murtadî, and a few verses praising the contributions of the physician and the teacher who are always willing to help more when they are well treated.

Incipit, حبیبکم الله يا بنی موارر الخیر وجنبکم مضارة الشبهه .

Fol. 2a reads

قال الشيخ العالم العلامة ذو الوزارتين

This is followed by the introduction, then the table of contents. The last folio contains a later official report that has nothing to do with the text.

The manuscript is dated 1121 A.H. (1710 A.D.). The number of folios is 494, and the majority of pages has 35 lines each. *)

Bank. 17.

Bankipore manuscript No. 17 is also located at the library mentioned above in India. It contains the surgical treatise, including the beautiful illustrations of instruments. Only a few chapters are missing.

Incipit, قال الحكيم الفاضل خلف بن عباس الزهراوى واضع هذا الكتاب ، لما اكلت

It is written in elegant Naskhî script in large letters. The last folio contains aphorisms attributed to al-Zahrāwî. The copy was completed Muharram 7, 584 (1189 A.D.), and as such it is the earliest dated manuscript of this part of *al-Taşrif* known either to us or to Ahmad Maulavi

*) We are indebted to the Smithsonian Institution and to our colleague S. A. Ali of the Institute of Universal Medicine for their cooperation in obtaining microfilms of the two manuscripts from India (Bank. 16 and 17) after much difficulty encountered in securing them.

‘Azim al-Dīn, (*Catalogue of the Arabic and Persian Manuscripts in the Oriental Public Library at Bankipore*, vol. 4, Calcutta, 1910, 28-36).
Number of folios is 240, with 16 lines in each page.

Bes. 502.

The Beṣir Āga manuscript No. 502 is located at Süleymaniye Umūmī library in Istanbul, Turkey. It contains the entire work of *al-Taṣrīf*, and is written in beautiful Persian Naskhī script with no glosses on the margins at all. Incipit, المقالة الاولى من كتاب التصريف لمن عجز عن التأليف. Unfortunately the scribe does not give his name, but he states that he completed copying the manuscript as of 18 Ramaḍān, 902 A.H. (1496 A.D.).
Number of folios is 570, with 33 lines per page.

Bes. 503.

Beṣir Āga manuscript No. 503 is located in the same library mentioned above. It contains likewise all thirty treatises of *al-Taṣrīf*, but there are several defects and a few folios missing. It is written in a different Naskhī, of which there are several types.

Incipit, المقالة الاولى من كتاب التصريف لمن عجز عن التأليف. The copying of this manuscript was completed by al-Faqīr ‘Ubays in 18 Sha‘bān, 1115 A.H. (1703 A.D.).

Number of folios is 736, with 33 lines per page.

Br. Mus.

The British Museum Library, London, England, designates this manuscript Additional 19619. According to the Museum's catalog, this fragment of *al-Taṣrīf* constitutes "folio 243 verso to folio 246 recto,"¹⁾ but we found that this fragment runs only to about the middle of folio 245 recto. The "Epistle of Najm al-Dīn al-Ṭūsī" follows immediately (fol. 245r.).

This fragment of *al-Taṣrīf* is the fourth section of the five contained in the twenty-ninth treatise. It discusses the stability of simple and compound drugs²⁾.

Incipit, رساله في اعمار العقاقير المفردة والمركبه من تصنيف الزهراوى الاندلسي

Excipit, ولست أشك أن بقاءه أكثر والله أعلم. تمت الرسالة. The handwriting is in a beautiful and legible Persian style of Naskhī script. The headings, subdivision, and names of simples are written in red ink, while the text is in black. No date is given on the fragment itself, but the manuscript of which it is a part bears the date 1103 A.H. (1692 A.D.). The number of lines per page is 20. See Carlos Rieu, *Catalogus Codicum manuscriptorum orientarum* (pt. 2, London, 1871), p. 458, No. 985.

Esc.

The Escorial manuscript Arabe No. 876 is at the "Bibliotheca del Monasterio de San Lorenzo el Real de El Escorial," Escorial, Spain. This library is rich in Arabic manuscripts, and was once richer still. Derenbourg reported it

¹⁾ Martin Lings, Assistant Keeper, Department of Oriental Printed Books and Manuscripts, letters dated November 24 and December 11, 1958.

²⁾ Leclerc erroneously referred to it as a part of the twenty-eighth treatise, *Liber Servitoris* (Leclerc, *Histoire*, 1: 453).

contains 1055 manuscripts, ¹⁾ a small fraction of the several thousand manuscripts once preserved there. Before partial devastations in the late nineteenth century and earlier, ²⁾ this library contained seven manuscripts of *al-Tasrif*. ³⁾ Now it holds only one. The microfilm, received through the cooperation of the librarian and of Professor G. Folch of Madrid, shows that the manuscript contains only the last two sections of the thirtieth treatise, with very few of the surgical illustrations.

Incipit, *عليكم ما تريدون منه بعون الله . الفصل الاول في علاج الما في* The first 43 folios are numbered and legibly written in beautiful Maghribi script. Folios 44 to the end are damp-stained, partially defective and not numbered. It has no beginning or end, nor is it dated. The number of folios is 56 (111 pages, $13\frac{1}{2} \times 20$ cm. each.)

Leid. 13.

The Leiden manuscript Cod. or. 13 (2), located at "De Bibliothecaris der Rijksuniversiteit" in Leiden, The Netherlands. This fragment contains the fifth (last) section of the twenty-ninth treatise, written in legible and beautiful Naskhī script. The title reads: *تفسير الاكيال والاوزان الموجوده في كتب الطب*. The interpretation is as follows: Explanation of the Measures and Weights Found in Medical Works in the Various Languages, Arranged According to the Alphabet.

Incipit, *قال الشيخ ابو القاسم الزهراوي رحمه الله*

Excipit, *نجزت الاكيال والاوزان بحمد الله اللطيف المنان*

It is dated 944 A.H. (1538 A.D.), comprised of folios 431 r. to 433 v. (6 pages), 29 lines each page, 20×30 cm.

This small fragment was examined by Engelmann and Hamacher in the nineteenth century but nothing was published by them on the text. ⁴⁾

Len.

The Leningrad manuscript No. D 169 is housed in the Institute Vostokovengenia of the U.S.S.R. Academy of Science in Leningrad. It carried no title, date, or author's name. ⁵⁾

Incipit, *امراض المعده ستة وعشرون مرضا تغير مزاج*. The manuscript is legible and beautifully written in Naskhī script. It contains a large portion of the second treatise. There are neither headings for chapters nor subdivisions, the whole long text running in one single paragraph from beginning to end.

Number of folios is 323, 23 lines per page, $17\frac{1}{2} \times 30$ cm size.

¹⁾ Hartwig Derenbourg, *Les Manuscrits arabes des L'Escorial* (Paris, 1884-1941).

²⁾ Muhammad A. Enan, *Decisive Moments in the History of Islam* (2nd. ed. rev., Lahore, 1943), 240.

³⁾ Nemesio Morata, "Un Catalogo de los Puntos Arabes Primitivo de el Escorial" in *al-Andalus*, 2 (1934), 104-44 and 205-7.

⁴⁾ P. Voorhoeve, Leiden, Letter of June 25, 1958.

⁵⁾ As also reported by Victor Rosen, *Collections Scientifiques de l'institute de langues orientales du ministere de affaires éstrangeres* (vol. 1, Petersburg, 1877), 92-8.

adv. 5007.

The Madrid manuscript Arabe No. 5007 is housed at the "Biblioteca Nacional" in Madrid, Spain. It was brought to Madrid from Toledo, where it was apparently written. The copyist, Yūsuf ibn Muḥammad al-Lawshī (Tal-shī?), carried out the work for the library of the mayor of Toledo. It contains the first treatise and a great portion of the second. The script is Maghribī, clearly and beautifully written.

Incipit, السفر الأول من كتاب التصريف لمن عجز عن التأليف. There is no end, the last sentence being left unfinished, thus: Excipit, إلا أنه لفظه وبعد استحالة. This well-kept manuscript¹⁾ starts with the author's introduction, then the table of contents for the entire work of *al-Taṣrīf*. This is followed immediately by the first treatise. At the end it is dated by the copyist May 1265 A.D.

Number of folios is 253, with 30 lines per page, 19 × 29 cm. size.

Majid Movaghar manuscript.

This manuscript is a private possession of Dr. Movaghar, founder of the Mehr Foundation, Iranian National University, Tehran, Iran. It is written in Naskhī script and contains only the surgical treatise including the illustrations in beautiful colors. Section 3 contains an elegant illustration of a screw, then a view of a pharmacy shop with drug jars and few tools of the apothecary is shown. Since the manuscript dates about 1311 A.D. this illustration seems of some historical significance as it shows how a drug store in Islam would look about this time.

Par 5772.

The Paris manuscript Arabe No. 5772 is located in the "Bibliothèque Nationale" in Paris, France, and has been referred to by Blochet.²⁾ It contains treatises sixteen to twenty-three inclusive.

Incipit, يشتمل هذا الجزء وهو الرابع من التصريف على ثمان مقالات. The handwriting is legible, in beautiful Naskhī script, but the manuscript must have been touched with dampness. There are scattered glosses on the margin, apparently by the same hand.

The manuscript has been copied by Muḥammad ibn 'Alī ibn Sawdūn al-Ibrāhīmī al-Ḥanafī.

Excipit, بيد محمد بن علي بن سودون الابراهيمي الحنفي غفر الله له ولوالديه. The date of the manuscript is Shawwāl the 3rd, 860 A.H. (1456 A.D.).

Number of folios is 181, of 25 lines per page.

Par. 6208.

The Paris manuscript Arabe No. 6208 is also at the "Bibliothèque Nationale" of Paris.³⁾ It contains only a part of the second treatise. The vertical writing on fol. 1b., which is partially defective, lists a number of prescriptions.

¹⁾ Thomas Magallon, Librarian, National Library, Madrid, Spain, letter dated July 3, 1958.

²⁾ E. Blochet, *Catalogue des manuscrites arabes des nouvelles acquisitions* 1884-1924 (Paris, 1925), 109.

³⁾ *Ibid.*, 211.

Incipit. الجزء الثاني من كتاب التصريف للزهراوي رحمه الله The handwriting is in a Naskhī script, much inferior to that of Par. 5772, and probably written by more than one copyist.

Incipit. يدل على موت الطفل علاج جميع ذلك على الجملة

No date is given.

Number of folios is from 1 b. to 59 b.; with 25 lines per page.

Rab. 635.

The Rabāṭ manuscript No. D635 is at the "Bibliothèque Générale," in Rabāṭ, Morocco. It contains a part of the second treatise, starting with the discussion on the diseases of the stomach.

Incipit. كتاب التصريف للزهراوي في امراض المعدة ستة وعشرون مرضاتغير مزاج قواها This section of the second treatise is followed by the third, fourth and fifth treatises of the second part (the practical) of *Kāmil al-Ṣinā'ah al-Ṭibbiyah al-Malikī* which are the thirteenth, fourteenth and fifteenth treatises of the entire *al-Malikī* (including the ten treatises of the theoretical part). The copyist, however, does not mention the name of 'Alī ibn 'Abbās al-Majīsi, the author of this work.

The manuscript is written in medium Maghribī script, by more than one hand, and was not kept properly. It is dated Sha'bān, 616 A.H. (1219 A.D.).

Number of folios is 253; with 15 lines per page, and 17 × 24 cm. size.

Rab. 1427.

The Rabāṭ manuscript No. D 1427 also in the above mentioned library contains treatises seven and eight and the first part of the thirtieth, including some drawings of the surgical instruments.

Incipit. ألقاه السابع من كتاب التصريف للزهراوي It is written in Maghribī script in a better handwriting and more carefully than the previous one. It probably was a part of a larger manuscript.

Number of folios is 29; with 27 lines per page.

Seh.

The Sehī Ali Paşa manuscript No. 2020 is located at the "Süleymaniye Umūmī Kütüphanesi" in Istanbul, Turkey. It contains treatises one to fourteen and sixteen to twenty-seven inclusive, with a few folios missing or defective.

Incipit. رب يسر يا كريم برحمتك فانك خير الرازقين It is written in legible Naskhī script, and was copied in 942 A.H. (1535 A.D.) by the scribe Muḥammad ibn 'Alī al-Hanafī al-Azhari.

Number of folios is 600, with 29 lines per page.

Taym.

The Taymūr Ṭibb [medicine] manuscript No. 137, was donated to the Egyptian National Library by the son of the late Aḥmad ibn Isma'īl ibn Muḥammad ibn Taymūr. As indicated in the manuscript it was once owned by Muḥyī al-Dīn Muḥammad ibn al-Maghribī. This manuscript contains treatises one through fifteen inclusive.

Incipit. كتاب التصريف . جنبكم الله يا بني موارد الخير It is written in beautiful Naskhī script in black and red ink. On fols. a and b (preceding fol. 1), the

brief comment of Hajjī Khalfah referring to *al-Taṣrīf* has been repeatedly quoted. Fol. 1 a contains a number of somewhat hard-to-read signatures, comments, and purchasing notes by persons who probably once owned the manuscript.

As in the Madr. 5007 arrangement, the Taymūr starts with the introduction, then gives a complete table of contents for the entire *al-Taṣrīf*. This is followed by the first treatise. There are a few scattered glosses on the margin in a different and inferior handwriting. These are comments, mainly in the form of headings. Here and there throughout the manuscript are a few defective folios (such as 116 and 212, together with the first and last folios).

According to Saqqā, a pharmaceutical chemist who saw the actual manuscript and secured the microfilm, it probably dates in the thirteenth century.¹⁾

Number of folios is 216, of 31 condensed lines per page.

Tub. 782.

The Berlin manuscript No. Ms. or. quart. 782, is temporarily at the "Universitätsbibliothek" in Tübingen, Germany. It contains treatises fifteen to nineteen inclusive, all in the same handwriting.

Incipit, المقالة الخامسة عشر من كتاب التصريف لمن عجز عن التأليف The table of contents for each treatise is listed nicely and clearly before the text. It is written in excellent and legible Naskhī script. A date given at the end of the sixteenth treatise is the year 993 A.H. (1585 A.D.) (سنة ٩٩٣ هـ), probably indicating the time of new ownership or selling.

Number of folios is 154, of 19 lines per page.

Tub. 783.

The Berlin manuscript No. Ms. or. quart. 783 is also temporarily at the University of Tübingen. It contains treatises twenty-one to twenty-three inclusive. But the last treatise is apparently incomplete, as the last folios are badly defective.

Incipit, المقالة الحادية والعشرون وهي مقالة جامع في أدوية الفم This manuscript continues Tub. 782, and most probably was written by the same copyist.

The number of folios is 127, of 19 lines per page.

Tub. 91.

The Berlin manuscript No. Ms. or. fol. 91 is presently also at the University of Tübingen. It contains the thirtieth treatise only, with the surgical illustrations in elegant design.

Incipit, الحمد لله على نعمائه وآلائه والصلوة على رسوله وآله It is written in large legible letters of beautiful Naskhī script, by an apparently eloquent copyist, Ḥamīd ibn Ramaḍān, who is interested in using rhythmical prose and flowery expressions of praise.

This manuscript—as stated in a gloss—was borrowed by ‘Abd al-Raḥmān ibn ‘Alī ibn al-Muayyid on Friday, 24th of Ṣafar, 914 A.H. (1509 A.D.), in Constantinople.

Excipit, (fol. 241 a). الحمد لله على تمام الكتاب

Number of folios is 241 (481 pages), of 13 lines per page.

¹⁾ Hasan M. Saqqā, Damascus, Syria, letter dated August 21, 1958.

Val.

The Vatican manuscript, Borg. Arabico No. 131, is located at the "Biblioteca Apostolica Vaticana" in The Vatican City, Italy. The manuscript is written in a hard-to-read, poor Naskhī script. It contains incomplete or fragmentary parts of treatises nineteen to twenty-one and twenty-three, with many defects, omissions and disorder in folios.¹⁾ The twenty-fourth treatise is mentioned in the table of contents but nothing of the text is actually included. The manuscript has no real beginning or end, and perhaps it was part of a larger one.

Incipit, *صفة ضماد نافع من الاسهال يؤخذ من الدقيق ويخلط* The folios 26-37 are written by a different copyist. Headings of sections as well as glosses are found in the margin in fourteenth- or fifteenth-century Spanish handwriting. Special comments are observed in the margin of the nineteenth treatise on perfumery and beautifying processes. It seems that these sections have been consulted frequently in the West.

The manuscript contains 38 folios, 18 lines per page, of 18 × 28 cm. size.

Vel.

The Veliyyüdin manuscript No. 2491 is at the "Süleymaniye 'Umūmī Kütüphanesi" in Istanbul, Turkey. A microfilm of this manuscript was obtained through the cooperation of Professor A. Süheyl Ünver of Istanbul. It contains the three last treatises, twenty-eight to thirty inclusive.

Incipit, *المقالة الثامنة والعشرون في اصلاح الادويه* It is written in a good and legible Maghribī script. The scribe states that his copy is from an earlier manuscript that, in turn, was copied from a manuscript read in the presence of the author himself. However, such a claim cannot pass unquestioned as a guarantee of faithfulness to the original. The copyist praises the contributions of *al-Taṣrīf*, for which sake he took pains to copy this voluminous work (Vel. fol. 228 b).

On an extra folio at the end of the manuscript appears a letter of consolation, meant for a man who unjustly and by force lost some of his wealth. This letter obviously had nothing to do with *al-Zahrāwī*.

The treatise contains, besides the text, a display, beautifully designed, of the surgical figures.

In 844 A.H. (1437 A.D.) this manuscript was legally purchased by a certain judge named Iḥlā al-Dīn ibn 'Izz al-Dīn ibn al-Ḥaḍīrī for three hundred "dīnārs" of silver in the currency of Aleppo, Syria. It is an indication as to how highly this work was esteemed at that time among those who could appreciate it. Later on in 1175 (1762 A.D.) it was owned by Veliyyüdin (Walī al-Dīn) ibn Muṣṭafā Āghā, whose name it now bears. The date of the manuscript is c. 663 A.H. or 1265 A.D. (see fol. 228 a).

The number of folios is 228 of 20 lines per page, 18.9 × 25.2 cm.

Wien 476 A.

The Vienna manuscript, Cod. N.F. 476 A, is located at the "Österreichische Nationalbibliothek" in Vienna, Austria. It is written in poor Maghribī script and introduced by a flowery, pious preface by the anonymous copyist.

¹⁾ Giorgio Levi della Vida, *Elenco dei manoscritti Arabi Islamici della Biblioteca Vaticana*, *Studie Testi* 67 (Vaticano, 1935), 259.

It contains the complete surgical treatise, including the surgical instruments crudely drawn in black and red ink.

Incipit, *حدّا يفوق وصف الواصفين ويفضل حدّ الحامدين*. There are marginal annotations in larger script. Folios 3 to 5 contain a list of all the chapters of the treatise.

Number of folios 115 (in 229 pages), 20 lines each page, of $7\frac{3}{4} \times 11\frac{1}{4}$ Austrian inches or Zoll.¹⁾

Wien 476 B.

The Vienna manuscript Cod. N. F. 476B, located in the above mentioned library, is not written in the same handwriting as Wien 476 A, although the script is Maghribī also. It contains the first two treatises.

Incipit, *قال أبو القاسم خلف بن عباس الزهراوي الطيب الماهر*. The text of the manuscript is organized in this manner: First the introduction to the work, followed in fol. 3 b, by a few brief introductory chapters. Third, on fol. 5 a, the complete table of contents of the whole *al-Taṣrīf* begins, which is followed directly by the first treatise. The text apparently was written by more than one copyist.

The manuscript has been examined by D. R. Kraus of Berlin, and Hermann Lehmann of Freiburg, Saxony in Germany; but as far as we know, nothing has been published by them concerning the text.

Number of folios is 340, $6 \times 8\frac{3}{4}$ Austrian inches in size²⁾ (1 Austrian inch is 2.63 cm.). The number of lines per page varies, and is not always 19 lines as stated by Flügel.

Wien 211D.

The Vienna manuscript Cod. Mixt. 211D also at the "Oesterreichische Nationalbibliothek" contains treatises twenty-four and twenty-five, written in large beautiful Naskhī script. The copyist was Yūsuf ibn Muḥammad al-Sharbīnī, a copyist and a surgeon at the Home of Healing, "Dār al-Shifā" (دار الشفا), in Cairo, Egypt. It was copied in the months of Jamādā I and II of the year 1027 A.H. (May and June of 1618 A.D.). On fol. 1 b, is a paragraph without a beginning in the manuscript, which undoubtedly continues a previous chapter that happened to become separated from the manuscript. The paragraph begins with the following phrase:

ثانية وقودا رفيقا وحرك الدوا حتى يصير في قوام المرهم

The manuscript was well preserved. There are several glosses on the margin, perhaps by the same copyist, with catch words as well.

Incipit, *المقالة الرابعة والعشرون في المراهم*

Number of folios is 1 b. to 59 b., of 21 lines per page.

b. *Other Known Arabic Manuscripts of al-Taṣrīf (not consulted)*

Asaf.

Maqalat manuscript was reported by Brockelmann to be located at Asa-

¹⁾ Gustav Flügel *Die arabischen, persischen und türkischen Handschriften der Kaiserlich-Königlichen Hofbibliothek zu Wien* (vol. 2, Vienna, 1865), 525 No. 1458.

²⁾ *Ibid.*, 525-6.

fiyya Library in Hyderabad, Deccan, India. ¹⁾ We are grateful to the State Central Library of Hyderabad for sending a microfilm of this manuscript, File No. 1298. It contains the 30th treatise written in Naskhī script, 130 folios of 15 lines per page, and includes fine illustrations of the surgical instruments.

Bodl. 491.

The manuscript Bodl. Or. 491 in the Bodleian Library, of Oxford, England, consists of folios 102-104, and 107-115. It is not dated and contains only fragments of the surgical treatises of *al-Taṣrīf*.

Gof.

The Gotha manuscript (Arab 1275; Stz. Kah. 969) is at the "Herzoglichen Bibliothek", now the "Landesbibliothek." It contains only a fragment of the surgical treatise, wherein folios 13 to 20 are written by another copyist.

The number of folios is 22, of 16 lines per page, and 16 × 21 cm. in size. ²⁾

Gran.

The Granada manuscript is at the "Bibliotheca de Sacro Monte de Granada Asin Palacies," of Granada, Spain. The Arabic manuscripts housed there have not been completely cataloged yet. There might be more than one manuscript or fragments of manuscript, but we were not able to obtain definite information, except that surgical material from *al-Taṣrīf* is in Granada.

Hunt.

The Huntington manuscript No. 156 at the Bodleian Library in Oxford, England, contains Part 2 only of the surgical treatise and was referred to and used by Channing. ³⁾ According to a letter (April 14, 1960) from Mr. N. C. Sainsbury, Keeper of Oriental Books at the Library, the manuscript consists of 172 folios and is dated 1465 A.D. Sauvaire referred to this manuscript in his study of Arab metrology (1884).

Leid. 2540.

The Leiden manuscript Cod. Or. 2540 is located at the University Library, Leiden, The Netherlands. It contains the second part of the thirtieth treatise together with the surgical drawings.

Incipit, الجزء الثاني من كتاب الزهراوى فى علم الطب والتشريح

The number of folios is 146 (291 pages) of 17 lines per page, and 16 × 22 cm. ⁴⁾

Madr. 57.

The Madrid manuscript Arabe No. Gg. 57 is reported at the National Library of Madrid, Spain. It is said to contain the fifth and last section of the twenty-ninth treatise on weights and measures. It was written in Egyptian Naskhī script in 914 A.H. (1508 A.D.) by 'Alī ibn B. al-Ashrafi.

The number of folios is 6. ⁵⁾

¹⁾ Carl Brockelmann, *Geschichte der arabischen Litteratur* (suppl. 1, Leiden, 1937), 425.

²⁾ Wilhelm Pertsch, *Die arabischen Handschriften der Herzoglichen Bibliothek zu Gotha* (vol. 2, Gotha, 1883), 25-6, No. 1989.

³⁾ Johannis Channing, *Albucasis de Chirurgia, Arabice et Latine*, (2 vols., Oxford, 1778).

⁴⁾ P. Voorhoeve, *Handlist of Arabic Manuscripts* (Leiden, 1957), 376.

⁵⁾ H. Sauvaire, "Arab Metrology. V. Traité sur les Poids et Mesures par

Mar. 54.

The Marsh manuscript No. 54 at the Bodleian Library, of Oxford, England, contains also part of the surgical treatise. On it, together with Huntington 156, Channing based his work.¹⁾ According to Mr. Sainsbury's letter of April 14, 1960, this manuscript consists of 133 folios and is dated 1271 A.D.

Mar. 42.

Mr. Sainsbury reports also that this is the manuscript referred to by Wüstenfeld (*Geschichte*, p. 86) and it contains folios 114-120 of which folios 116-120 include "Tafsīr al-Akyāl Wa-al-Awzān" (تفسير الأكيال والأوزان) on explaining the measures and weights.

Mrk. 21.

The Marrākush manuscript No. 21, at the Library of al-Kalāwī, in Marrākush, Morocco, contains, in part, treatises twenty-eight to thirty inclusive. It is written in beautiful Andalusian script, with the surgical illustrations displayed in various colors. It is dated Dhī al-Qi'dah, 610 A.H. ? (1213 A.D.). This manuscript is now housed at the general library in Rabat under the number 21 J (ج ٢١). I recently acquired a microfilm copy and found that the 165 folios of the manuscript (each page contains 25 lines) are bound in disorderly fashion. (S.H.).

Mrk. 404.

The Marrākush manuscript No. 404 in the library of the College of Ibn Yūsuf, Marrākush, Morocco, contains treatises one and part of two, and the books of medical classification (التقسيم الطبي) and the causes of diseases²⁾ by Yuḥannā ibn Māsawayh (777-857 A.D.) who is known in the West as Mesue the Elder (see table 2).

Incipit, الحمد لله رب العالمين والعاقبة للمتقين It was written in beautiful Naskhi script in the year 830 A.H. (1427 A.D.).

Number of folios is 107; with 27 lines per page, of $26 \times 17\frac{1}{2}$ cm. size.³⁾

I recently acquired a microfilm copy of this manuscript (S.H.) It is at the general library in Rabat under the number 404 Y (ي ٤٠٤).

Par. 2953.

The Paris manuscript Arabe No. 2953 is located at the "Bibliothèque Nationale" of Paris. It contains the three sections of the surgical part (المقالة في العمل باليد), and is written in beautiful Maghribī script. The surgical drawings are elegantly displayed also. It is dated the sixteenth-century. See Maxime Laignel-Lavastine, *Histoire Générale de la médecine, de la pharmacie, de l'art dentaire et de l'art vétérinaire* (vol. 1, Paris, 1936), 506-507.

Number of folios is 112 and page size is 20.5×27.5 cm.

Ez-Zahrāwī," in *The Journal of the Royal Asiatic Society of Great Britain and Ireland*, 16 (1884), 495.

¹⁾ Channing, *Albucasis*, 2 vols., Oxford, 1778.

²⁾ 'Abd Allāh al-Rajrājī, Chief Librarian and Curator of "Bibliothèque Générale," Rabāt, Morocco, letters dated October 20, November 24, 1958, May 21 and June 9, 1959.

³⁾ Ibid., letters dated October 20, 1958 and June 9, 1959.

Par. 6461.

The Paris manuscript Arabe No. 6461 is also located in the above-mentioned library, and contains an extract of the surgical part. Blochet overlooked the fact that the name of al-Zahrāwī was spelled erroneously in the manuscript.

Number of folios is 232.¹⁾

Par. 6824.

The Paris manuscript Arabe No. 6824 is also located in the "Bibliothèque Nationale." It comprises the surgical part, written in Egyptian Naskhī script, and dated in the fourteenth century.²⁾

Top.

The Topkapı Sarayındaki manuscript No. 1990, at the "Ahmet Salis Kütüphanesi" in Istanbul, Turkey, contains the thirtieth treatise, including about 215 elegantly colored surgical drawings.

Incipit, *قال واضح هذا الكتاب لما اكلت لكم يا بني هذا الكتاب* It was donated to the library by Sultān Aḥmad III, the celebrated monarch of the Turkish (Ottoman) Empire.

Excipit, *وانه يبرا سريعا . كل الكتاب يعون الملك الوهاب* This manuscript was referred to by Süheyl Ünver in regard to the influence of al-Zahrāwī's work on the development of Turkish surgery. Number of folios is 171, of 15 lines per page, 18 × 26.5 cm.³⁾

c. Other Manuscripts Used in This Study

Cushing Manuscript. Part of al-Rāzī's *Kitāb al-Hāwī al-Kabīr* (the *Continens*) in the Cushing Collection at Yale University medical library. This manuscript was secured by Dr. H. Cushing through the efforts of Dr. Sa'eed of Iran; see Jay M. Rasooli and Cady H. Allen, *Dr. Sa'eed of Iran* (Grand Rapids, Michigan, 1958), 152-53 and 159-160.

Damascus Manuscript, No. 7565 contains the first ten theoretical treatises of al-Majūsī's *al-Malikī* and not the practical part; in the al-Zāhiriyyah Library at Damascus, Syria.

Osler Manuscripts, Nos 449 and 450 in the Osler Medical Library at McGill University, Montreal, Canada. The first contains part of al-Rāzī's *Kitāb al-Hāwī al-Kabīr* written in Naskhī script. The second has an incomplete copy of al-Rāzī's *Kitāb al-Kunnāsh al-Fākhīr* on medicine. This manuscript was purchased from Tehran through the efforts of Dr. Sa'eed of Iran.

Sommer No. A26 item 2. This manuscript is in the National Library of Medicine, Washington, D.C. It contains al-Majūsī's complete work, *al-Malikī* in its two parts, the practical and the theoretical (twenty treatises).

We wish to extend our gratitude to the above mentioned libraries for their courtesy in allowing us to consult these manuscripts.

¹⁾ Letter from the "Nationale Bibliothèque" of Paris, dated July 17, 1958.

²⁾ Blochet, *Catalogue*, No. 6461.

³⁾ A. Süheyl Ünver, and Hüseyin Usmān, *Meshhur Arab Cerrahi Ebülhasimi Zehravi ve onun Kitabül Cerrahiyesi* [Istanbul] (, 1935), [1], 4. This publication is an extract of a paper read before the International Congress of the History of Medicine, held in Madrid, Spain, in September, 1935.

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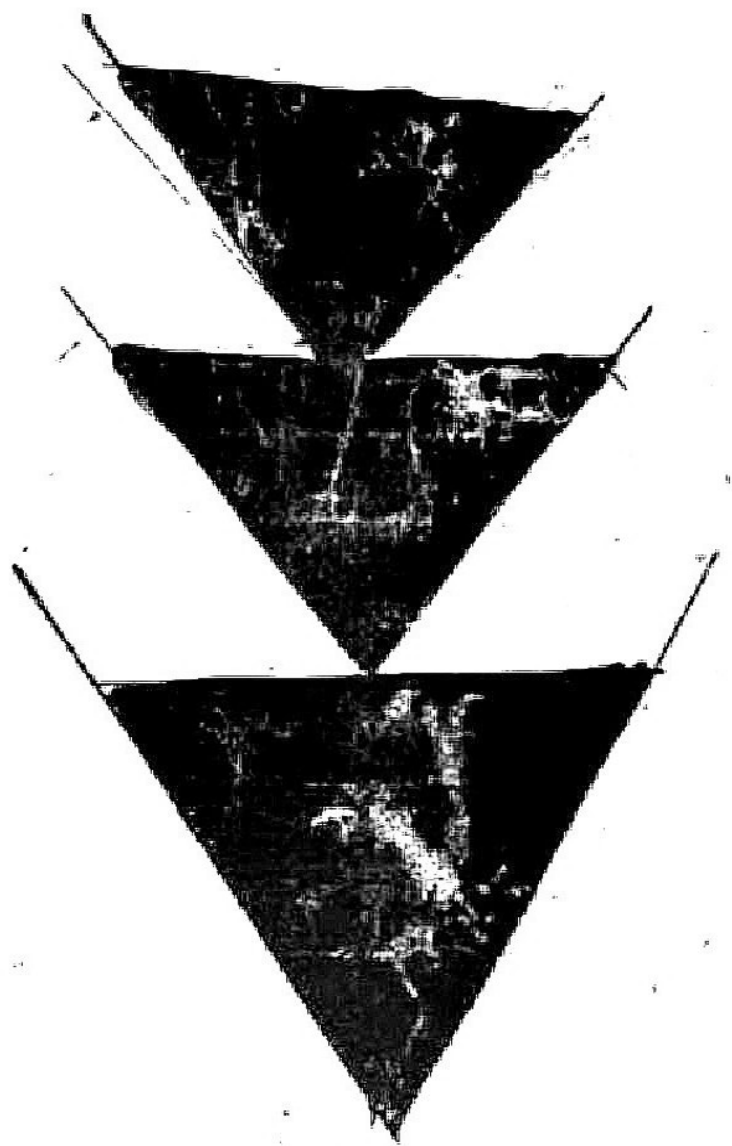
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فان اردت ان يروى في المطوح
 المطوح الاصول والروفا
 والعراسول والسر كسبح
 واصاف الحاج وشامس
 المطوح ادا وعت
 طحها وورشها صفيها
 اولاً يحل شعيرم بدحل المروا
 عصا في عصا الأصغر
 الاوسط والاوسط في
 الاكبر وكحل في الاصغر
 من ليف الحمار او الحبل سموا
 او ورشوا لجيل مختبوا
 مثل نصف المروا وكحل
 كحلها اما سببه ما قطر
 ثم مص في المروا والا على



الذي هو اصغر الذي فيه الليف المطوح وشركه منه ما يول من عصا
 بمسه فانه يول من الاول الى الثاني ومن الثاني الى الثالث فان اشترها المروا
 فان قال المطوح ولم يجز منه شيء فارجع ما فيه واعسله بالمال من
 الاثقال ثم ردا المطوح ودعه يروق ولا يزال يفعل به ذلك ويصير عليه
 الى ان يول المطوح اجمع ثم يري الانتقال ونسبها المطوح فيما تريد

Fig. 15. Strainers used by al-Zahrāwī. (See pp. 160-61)

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ
 المَقَالَةُ الخامسة والعشرون قال الشيخ
 ابي القاسم خلف بن عباس الرضائي رحمه الله تعالى
 هذه المقالة افرقتها في الادهاان ومنافعها وخواصها
 واختلاف صناعاتها وكيفية استعملها اعلم ان
 منافع الادهاان في اعمال الطب جلياله وفي علاج
 الامراض عظيمه كان الا فاضل من الاول يستعملونها
 في علاج الامراض والتفريح من خارج وبالشرب
 من داخل وهي من داخل وهي تنقسم قسمين لان
 منها ما يفعل بقوة خاصه في الدهن من غير ان يخالطه
 شيء من الادوية ومنه ما يفعل به بادويه تخالط الدهن
 وتلك الادوية منها بسيطه ومفردة ومنها ادوية
 كثيرة مختلفة فاما الادهاان التي تنفع بقوة خاصه
 فتلك الزيت والشرج ودهن اللوزين ودهن اللوز
 الجوز ودهن بزر الكتان ودهن الحبة الخضراء
 ودهن القرم ودهن الخوخ ودهن النخل ودهن
 البندق ودهن البلسان ودهن الفمخ ودهن البخ
 ودهن القزع ودهن الشونيز وما أشبه ذلك
 من الادهاان التي تأتي وصفها فيما بعد وصناعاتها
 ومنافعها على مراتبها وفي مواضعها بعد استقصا
 ان شاء الله تعالى واما الادوية التي تخالط الدهن

المفردة

المقهورين مع الاياواح الغنيرا ومع ما الاصول فيقصد هم صفة
الدهن الذي كان يعالج به طبلون المنتطب رطوبة الرأس وهو علاج معروف
النفق مشهور ليس من العلاجات ابلغ منه يوجد سبيل وكثيرا من كل واحد
اوقيه ميوذج او قتيان سداب او قتيان عاقر قريظ ثلاث اوراق فربون ربع
اوقيه مصطكى او قتيان مبيد يابس حديد اوقيه بنك اوقيه حب الهمشيت
اورقته اوقيه رقيق اوزيت طبخ نصف رطل ثم عشرة رومن تدق
العقاقير وتنقع خلا الفربون والمصطكى والحديد في عشرة ارطال من طلال
تدريج ويترك عشرة ايام ثم يلقى الدهن على الطلال ويحلى على النار في قدر
مخرج مضاعف حتى يذهب بعض الطلال ويصفى ويعصر العقاقير فيها
ثم تعاد على النار في القدر المضاعف ويلقى فيه الفربون والمصطكى والحديد
ثم يطبخ حتى يطهر يذهب الطلال ويبقى وحده ويصفى ويرفع ويستعمل
وصفه استعماله ان تحك به الرأس في موضع الدماغ
لطفا حتى ينسرب به فتعمل ذلك ثمانية ايام غدوة وعشية لكل دهنة نصف
اوقيه فيبلغ ما يحتاج اليه وان لم تجد دهنا الهمشيت فاجعل مكانه
دهن الخوص المرصوف قل هذا في باب ان شاء الله تعالى
المقالة الخامسة والعشرون من كتاب البصريح لمن عجز عن التأليف
وكل الفراغ من كتابة هذه المقالة بين يوم الاثنين المبارك حادي
عشر شهر جمادى الاخر من شهر رجب سنة ثمان مائة على يد العبد الفقير الى الله
مغالي يوسف بن محمد بن محمد الشربيني
الجراح بهلر خادم الفقرا ابد الشفا
مصر
المحرر

Fig. 17. Last Page of the Twenty-Fifth Treatise. (See p. 161)

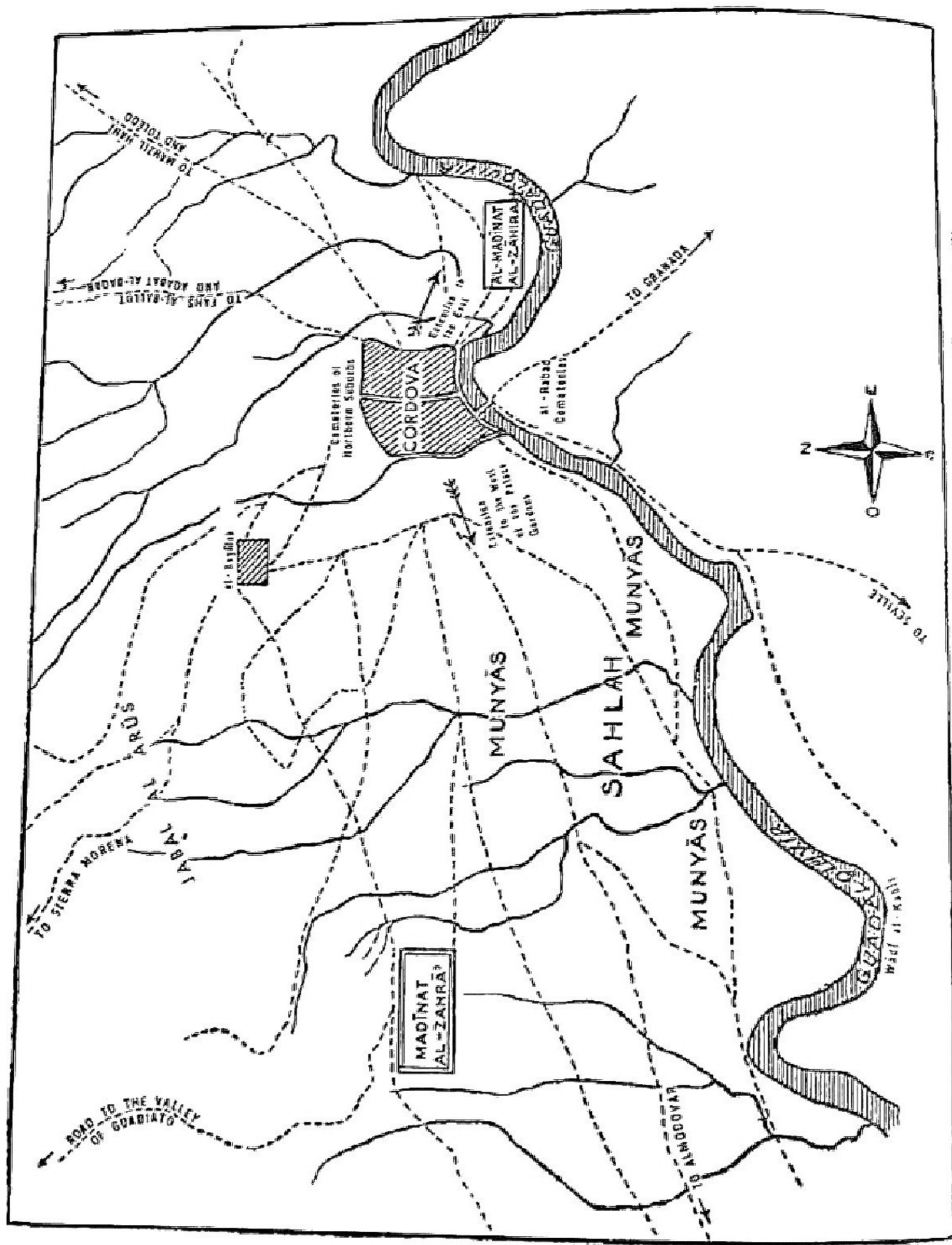


Fig. 4. Suburban Cordoba during al-Zahrawi's lifetime. (See p. 158)

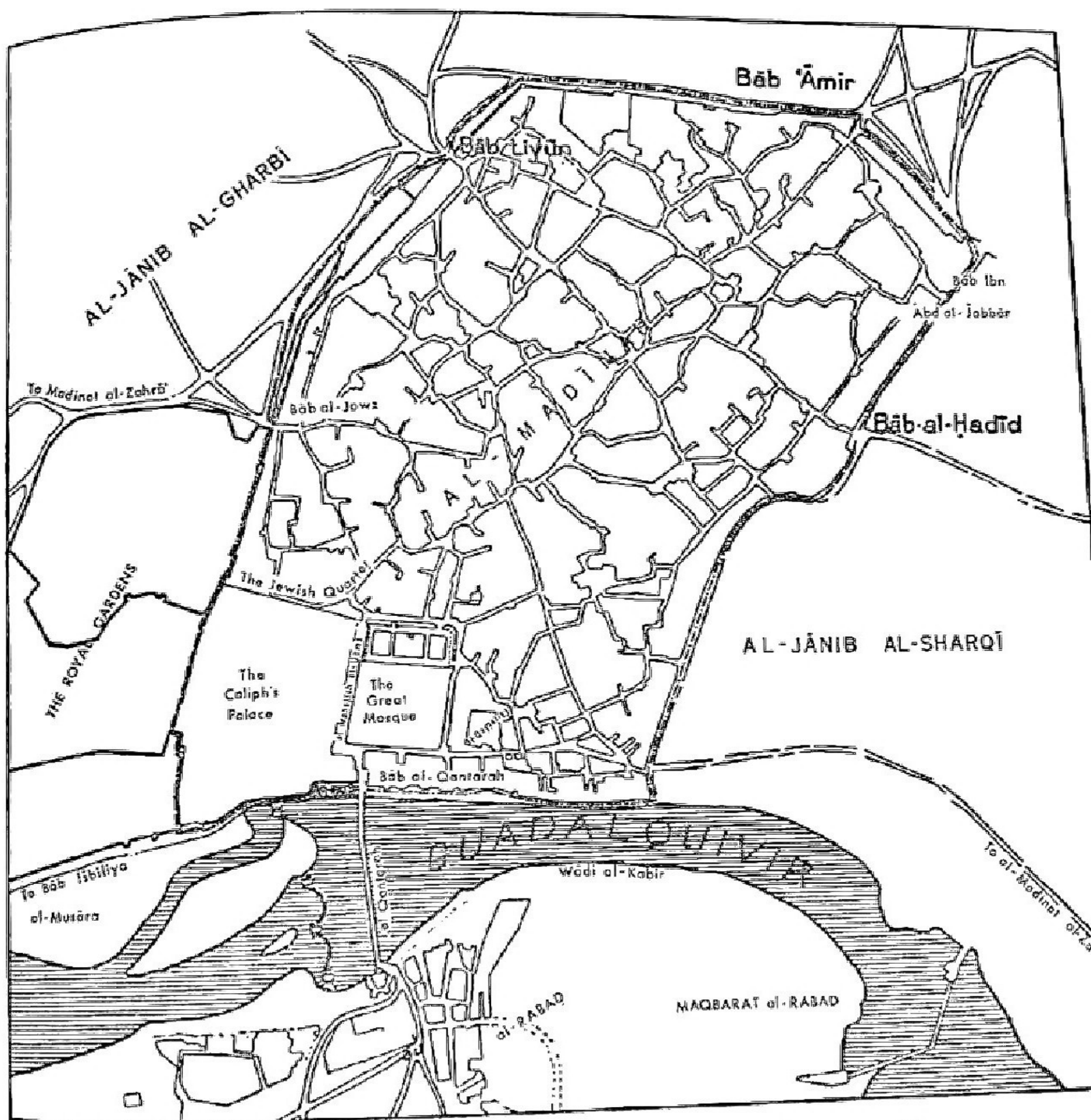


Fig. 3. Cordova in the Tenth Century. (See p. 158)

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xxviii. Bulchasi Benaberazerim traslatus a Si-
mone ianuensi interprete Abraa iudeo tortuosiensi.

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Ixit aggregator huius operis :
Postq̄ ego collegi librum hunc
magnum i medicis cōpositis: q̄ ē
liber magni iuuamenti : quem
nominaui librum seruitorem.
& compleui libros suos omnes

secundum uoluntatem meam: inueni in multis
medicis compositis libri huius medicinas multas
simplices que indigent preparatione ante horam
necessitatis magne earum: quemadmodū succos
exprimere: & medicinas cōbutere abluere & cōficere
aliquas ex eis. Et discernere que ex eis bona sunt:
et que non bona. & alia secundum hanc formam.
Preuidi igitur aggregare omne quod ē necessariū
in hoc: secundum rememorationem meam. Et
ordinaui hunc librum in tres tractatus.

Primus eorū ē de preparatiōe lapidū & mineraliū so-
lū: & de ablutiōe eorū: & de adustiōe & cōfectione
eorum sicut est marchasita & atramentum &
calcantum & colcotar & species aluminū & spēs
salis & plūbū & ferrū & es & cohol & scoria argēti
& scoria auri: & ē de ablutiōe thucie & calcis: & ē de
sublimatione argēti uiui & arsenici: & de medicis

Albucasis.

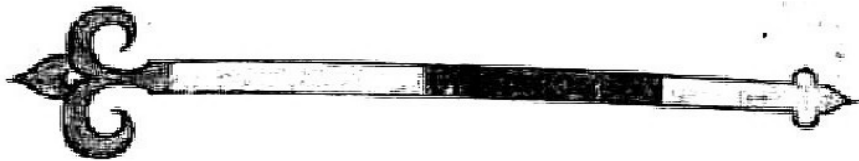


Fig. 5. Fifteenth-Century Depiction of al-Zahrāwī. (See p. 159)

من مَوْرَةِ مِثَارَةٍ ٥ ٥ ٥



هذه المِثَارَةُ يَكُونُ فِيهَا غَلَطٌ قَلِيلٌ لَكَ لَا تَنْكَسِرُ عِنْدَ جَلْدٍ
لِجَنِينِهَا صَوْرَةُ ذَاتِ الشُّوْكَ كَثِيرِينَ ٥ ٥ ٥



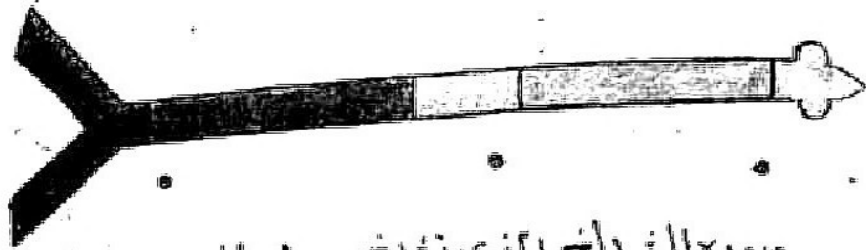
صَوْرَةُ مِثْطَعَيْنِ عَرِيضَيْنِ لِقَطْعِ الْجَنِينِ ٥



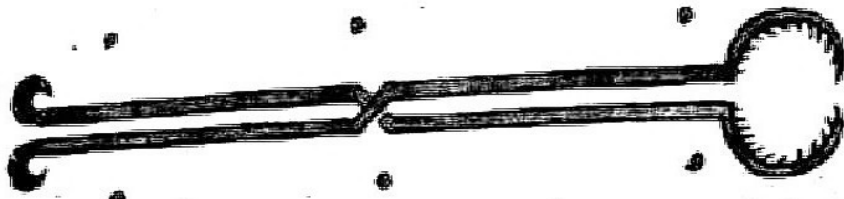
صَوْرَةُ مِثْطَعِ زَوْطَرٍ فِيهِ الدَّنُّ يَقْطَعُ بِهِ الْجَنِينُ
أَنْ شَاءَ اللَّهُ تَعَالَى

Fig. 11. Obstetrical Instruments Illustrated in *al-Taṣrīf*. (See p. 160)

وَاللَّهُ أَعْلَمُ بِالْصَّوَابِ



صورة المشدخ الذي تشدخ به رأس المجنون إن شاء الله تعالى



تشبه المقص له أسنان في الطرف كما ترى تدفع مستطلة

كالكلاب على هذه الصورة كما ترى لها أسنان كالأسنان

المشار تقطع فيها وترضان بشا الله تعالى



هذه صورة مدفع أيضا ه ه ه

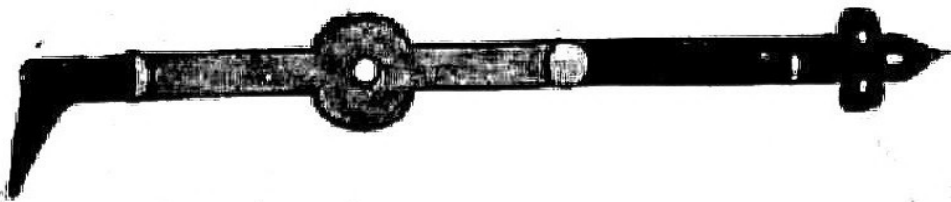


Fig. 12. Obstetrical Instruments Illustrated in *al-Taṣrīf*. (See p. 160)

فاجلس المرأة على سرير مَدَلَاةٍ رِجْلَيْهَا مَنْفُوجَةٌ مَا بَيْنَ
 مَا بَيْنَهَا ثَمَّ ادْخُلْ هَذَا الزَّائِدَيْنِ مَحْمُومَتَيْنِ فِي الرَّحْمِ وَأَنْتَ
 مَا بَيْنَ طَرَفِ الْآلَةِ امْسِكْ لِحْدَيْهَا ثَمَّ افْتَحْ يَدَكَ بِالْأَلَةِ كَمَا
 تَفْعَلُ بِالْكَلْبِ يَبِ سَوَاعِي قَدْرًا تَرِيدُ فَتَفْتَحْ قَرَارَ الشَّجَرِ حَتَّى
 تَضَعَ الْقَابِلَةَ مَا تَرِيدُ إِنْ شَاءَ اللَّهُ تَعَالَى وَتَقْدَسُ صِفَتُهُ
 لَوْلَا آخِرُ ذِكْرَتِهِ ثُمَّ وَايْلَكَ تَدْفِعُ بِهِ لِلنَّسَاءِ

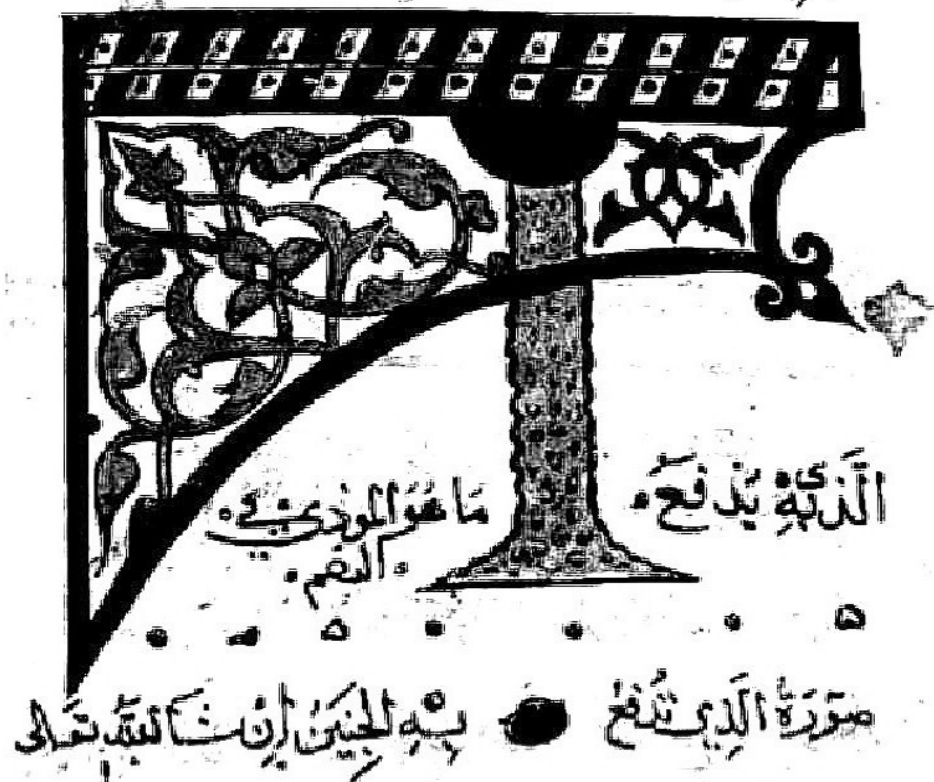
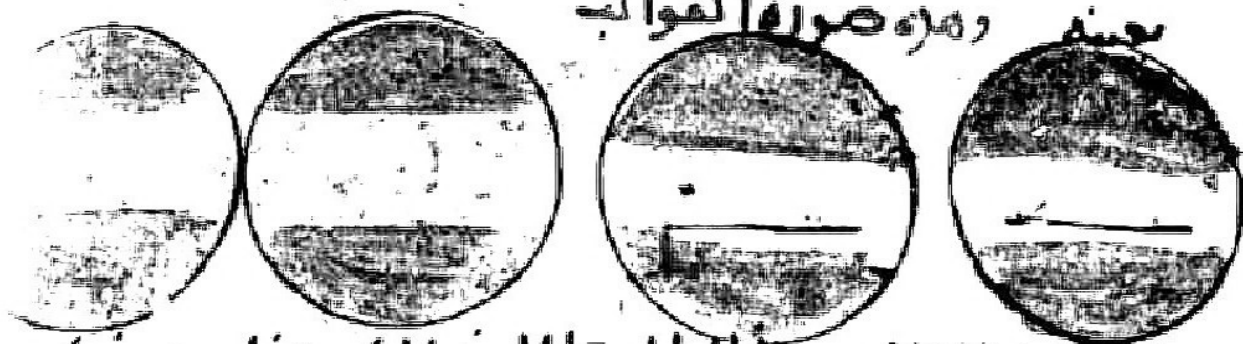


Fig. 13. Obstetrical Instrument Illustrated in *al-Taṣrīf*. (See p. 160)

زان شئت صنعت قال لا آخر مختصرا على هذه الصفة تصنع من القش
 او من حجر المسد ايرتر محروطين بحكمن وسنح في كل دائرة قدر
 نصف العرص وسنح في الوجه الواحد اربعة ارباع اسم العرص والا
 فدرجه المسد لطبع فيه اجزاء ثمانية من الاقراص وار شئت
 صنعت على هذه الصفة بوال كره ونقشت في كل واحد اسم عرص

بعينه وهذه صورها القوالب



دار اربعت ارباع في العرص في القالب على الوزن الذي يريد فاصنع ورحم
 وانها طريا وزنه على حسب ما يريد ثم اصنع القالب على هذه القياس
 على المدر الذي كعب كفيفه ترون القوالب مطبوعات وصوره
 المرائق، معي ان تبدل ترون القوالب مطبوعات ثلاث مرات واحدها
 وهو الاول ان يسكور احوال الى و حرفة الى الحفة والى الى اكر
 من الاول و حرفة الى حفة من الاول والى الى اكر من الاول و حرفة
 صفيقه، حيره صورها المرائق

يدور
 فان اردت ال

Fig. 14a. Moulds for Tablets. (See p. 160)

حاشاً

تليلاً وسرعه حي ينكر وسرع الا كلال يصعبه على عروال ثم
 تدارك عليه حي ينزل جمعه من حب العروال وسعي او ساجه وخشبه
 من بود با حده وسعاه لحا حكه وعلى هذا الحال تدر الصوع كلها
 بل السكسج والحا وشروا خلقت والمعل والعدروت والا لور ودا
 اسبه هذه صعه عمل القالب الذي يصنع فيه الا واصر
 باط لوط من يقبل او ابنوسا و حجر من حمار المسراو عا ج او نراى عود
 شيت يكون صلما ابلس يكون طولها بلان اصابع و طولها شهر و علقه
 اصغار بعد و تحرقا حشام بشر على بصعين على طولها يكون تحل
 لوح منها اصبعان ثم يفتح في الو جهر جميعا بال قاطط دوا بر على قدر
 العر و هذه و ما يزيد من علقه و رفته ثم تحفر في كل وجه قدر
 علقه نصف العر و يفتش في قعر احد الوجهين اسم العر الذي
 زل ان يصغه اما و رد او اما مفتحا او عرهما ويكون العر معلوما
 ليا تي على طبع العر مستقيما و ان شئت ان لا يفتش في كل جعرة اسم
 العر على انوار لطبع في قالب واحد او احدا حيا كبره من
 فاذا انطبع فيه ذهبت الحما من دهر شاكل لللك الا واصر ان كانت
 الا واصر و زد ذهبه بر دهر و زد اذ يفتح ذهبه بر دهر يفتح و طبعها
 فيها في ساعه وهذه صورة القواب

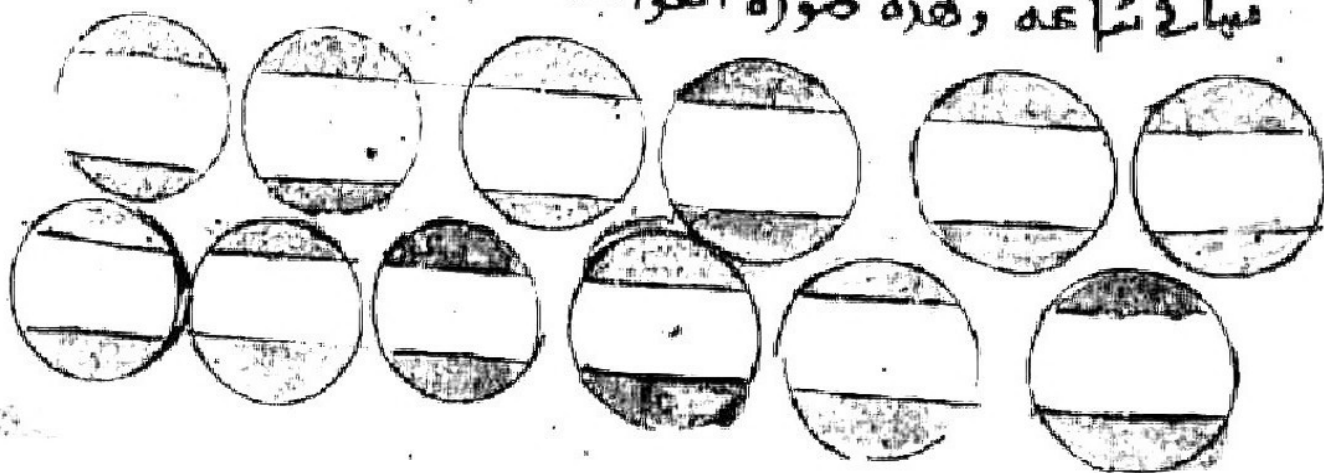


Fig. 14b. Moulds for Tablets. (See p. 160)